Rinnai ENERGYSAVER® Direct Vent Wall Furnace Installation Fundamentals

Rinnai®

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The following course is approved for NATE continuing education hours (CEH's).

This course will earn the following CEH's:

Warm Air Heating-Gas-Installer – 2 hours
Warm Air Heating-Gas-Service – 2 hours

If you require credit for NATE, please notify the instructor at this time.

Rinnai Service and Support (*800-621-9419*)

Rinnai America's phone support structure consists of the following departments:

- **CRC – Consumer Response Center – Fielding general calls, consumer questions, etc.**
  - Available in office from 8 a.m. to 8 p.m. EST**,** Monday - Friday
- **Parts and Warranty Department – Fielding parts orders and warranty issues**
  - Available in office from 8 a.m. to 5 p.m. EST, Monday – Friday
- **Technical Support Department– Fielding technical issues related to the function of all Rinnai Products**
  - Available in office from 8 a.m. to 8 p.m. EST, Monday – Friday AND **24/7/365** on call support for technicians who are at the service location.
- **Engineering / Applications Department – Fielding issues related to product applications including sizing**
  - Available in office from 8 a.m. to 5 p.m. EST (The engineering dept does not size heating appliance applications—an industry accepted Btu heat loss calculation must be performed by the installer)

Rinnai America also provides the following web sites for support:

www.rinnai.us – our main site for all product, sales, and service information. Of Note—a comprehensive documents library is available at the sales/service link. Website registration is required for access.

Product Model Numbers and Specifications

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NEW MODELS	PREVIOUS MODELS	CFM*	MAX POWER*	DECIBELS*	INPUT BTU RANGE*	AFUE (Efficiency)*
EX08C	ES08, RHFE 201 FA	55.5-82.0	41-42 W	27-36dB	3,000-8,000 NG/LP	NG-82% LP 83%
EX11C	ES11, RHFE 263 FAII	69.3-102.5	44-47 W	31-38dB	5,500-11,000 NG 5,700-11,000 LP	NG-81% LP-82%
EX17C	ES17, RHFE 431 FAIII EX17, RHFE 431 WTA	111.3-137.8	40-46 W	33-38dB	8,200-16,700 NG/LP	NG-81% LP-82%
EX22C	ES22, RHFE 556 FAIII EX22, RHFE 556 WTA	111.3-162.7	52 W	32-42dB	8,200-21,500NG 8,200-20,700 LP	NG-81% LP-82%
ES38	RHFE 1004 FA	203.4-360.6	121 W	37-47dBA	10,500-38,400 NG 10,500-36,500 LP	NG-80.6% LP-82%

Ensure the correct part number is identified for service / parts support
*Current model specifications-previous models may slightly vary

ES38

EX17C
EX22C

EX08C
EX11C

All models available in beige EX22(C) and ES38 models are also available in white.

Beige

White

- When sized correctly, the ENERGYSAVER® Furnace can be used as a whole house/primary heat source.
- Easy Control and Operation
  - One-touch ignition
  - Programmable thermostat with a temperature range between 55° F to 95° F (13° C to 35° C)
  - During normal operation, the display will dim to save power
  - Display available in Fahrenheit or Celsius
  - Setback and Frost Protection allows a minimum temperature to be maintained even when off or between scheduled heating events
  - Adjustable maximum temperature setting
  - Energy saving economy setting

- The unit's standby power consumption is less than 1 watt.
- Seven-stage Intelligent Modulating Gas Valve and blower control.
- Warm air discharge at floor level.
  - Directional louvers to optimize direction of air flow.
- Ultra-quiet operation-Decibel range of 27-47 is comparable to a normal conversation.
- Gas type is field convertible.
- Restart Functions allow automatic restart after ignition, combustion, or power failures.
- Small 3" diameter concentric vent.

Safety Features

- Self Diagnostic Circuitry-Should the ENERGYSAVER® detect an unsafe operating condition, the unit will shut down and a fault code will display indicating the specific issue.
  - If the code is due to an ignition or combustion failure, the unit will attempt to relight automatically.
- Function/Child Lock
- Cool to the touch Cabinets.
- Restricted air filter indication lamp and audible reminder-Current model ENERGYSAVERS will flash a reminder lamp and emit an audible beep if it detects operational conditions indicative of a restricted air filter.
- Sealed Heat Exchanger-flame and combustion is sealed from the heating area.

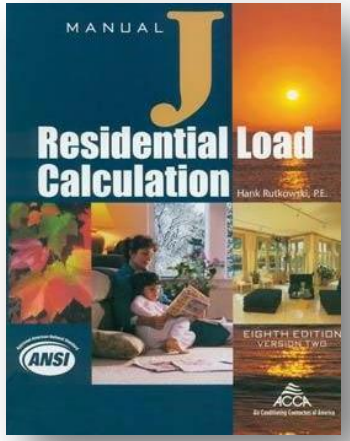
Safety Features

- Overheat protection- Multiple temperature sensors monitor the appliance's temperature. Shut down occurs if an unsafe operational temperature is detected.
- Combustion and convection fan validation-should either of these fans fail to maintain the proper speed (likely due to a restriction), the PCB will not allow the unit to operate.
- Electronic ignition-no standing pilot.
- Power failure protection-Should the ENERGYSAVER lose power, the gas supply will automatically close. Upon resumption of power, the unit will automatically attempt to restart.
  - ENERGYSAVERS are equipped with an inline glass fuse and surge protection to protect from over-current or power surge.

ENERGYSAVER® Sizing

To ensure the ENERGYSAVER operates as designed, an industry standard Btu heat loss calculation must be performed on the area to be heated.

- This calculation considers all factors that contribute to heat loss such as:
  - Area and volume of the space to be heated
  - Geographical location and climate where the furnace will be located
  - Structural characteristics of the building such as number of windows, exterior doors, construction material, etc
- The Air Conditioning Contractors' Association (ACCA) has an industry standard Btu calculation in their "Manual J" publication.
- A qualified and licensed installer should be familiar with this type of calculation.
- Visit http://www.acca.org/ for more information.
- Rinnai also offers a basic DV sizing calculator at http://www.rinnai.us/heat_selector_2007.swf



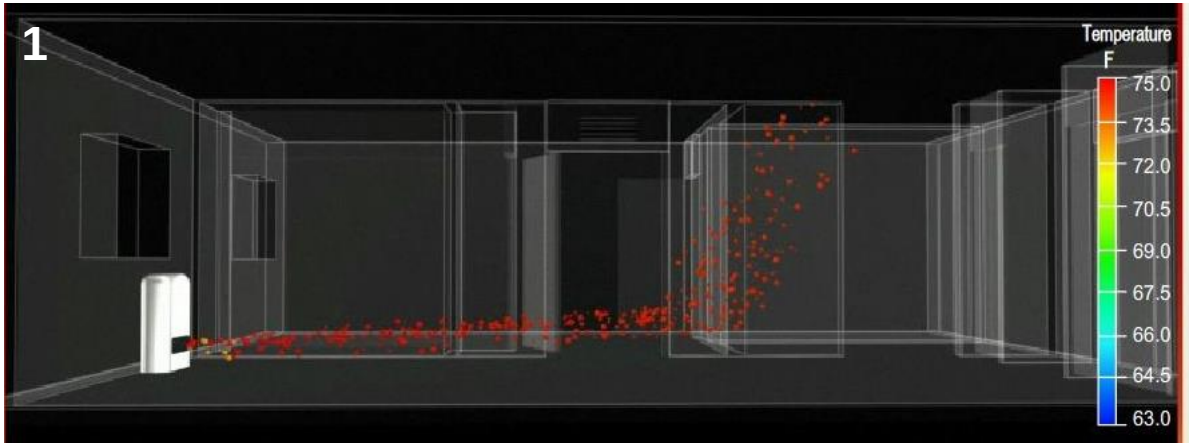
- NOTE: Incorrectly sized applications can lead to the ENERGYSAVER short-cycling or failing to bring the area to the desired set point temperature.

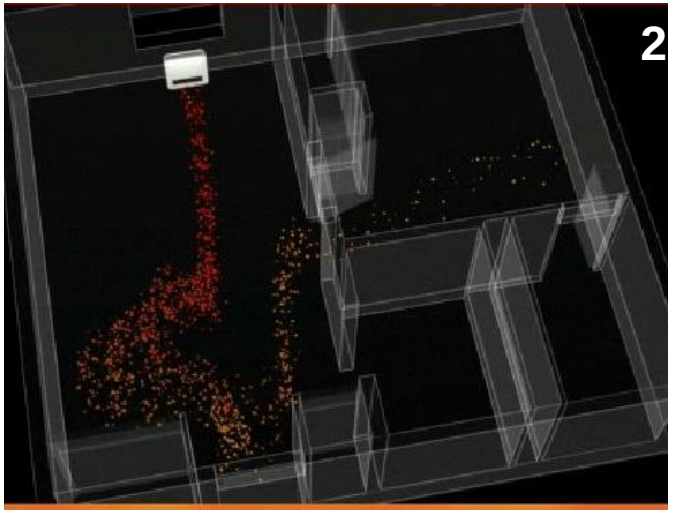
ENERGYSAVER®—Whole House Furnaces
Key concepts

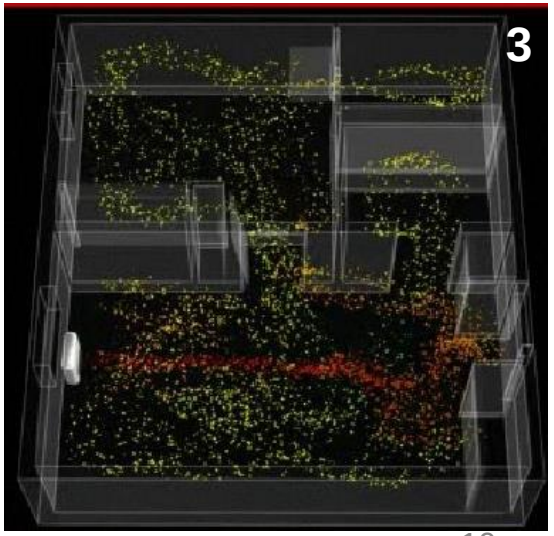
The ENERGYSAVER has the ability to heat an entire structure from a central room. Here's how:

- 2nd law of thermodynamics – Heat seeks cold
  - Once the main room approaches the set point temperature, the heat begins to move to other rooms—seeking cold.
  - The variable gas valve and blower control modulate to ensure heat reaches the remainder of the structure without overheating the main area.
  - Cold air is detected quickly by the thermistor—mounted two inches above the floor and able to detect changes as small as 6/10th's of a degree (Fahrenheit).
  - These features aid in reducing stratification in the atmosphere (different layers of room temperature).

(Click here to watch animation)



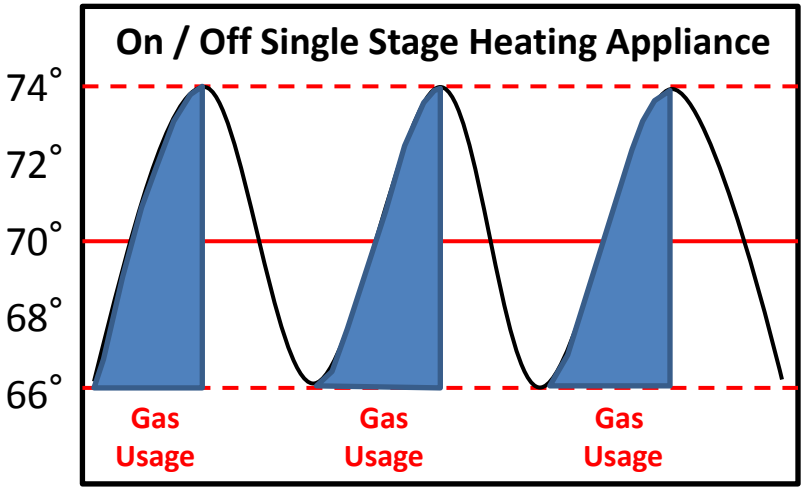




ENERGYSAVER®—Whole House Furnaces
Key concepts

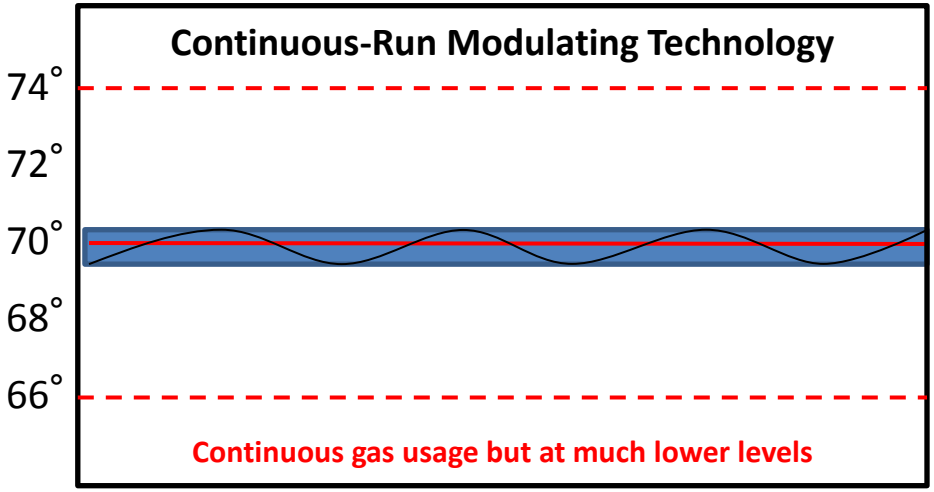
- Variable speed technology – Modulating gas and air based on the heat loss at that moment

  - With on/off single stage operation, gas usage can be high due to alternating periods between maximum flame and no flame at all



  - This results in different layers of temperatures throughout the structure leading to a less than comfortable living environment

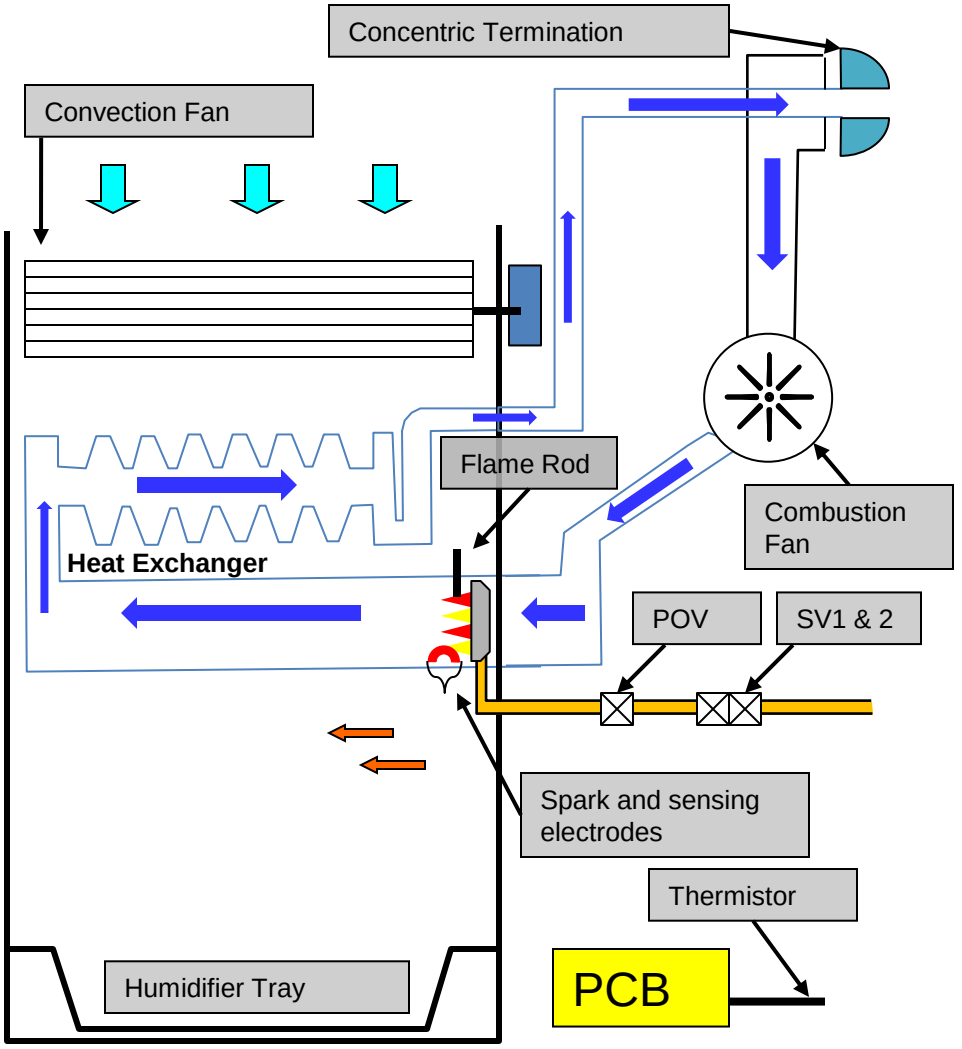
  - The Energysaver's modulating technology has the ability to replace only the heat escaping the structure by continuously operating at heating levels based on the demand at that moment



  - This leads to lower gas usage and higher levels of comfort.

ENERGYSAVER® Direct Vent Furnaces
Operation Sequence

1. Combustion fan purges heat chamber, PCB verifies fan rotation
2. Ignition spark begins
3. When sensing electrode detects spark, gas valve assembly opens
4. Ignition occurs and heat exchanger warms
5. Spark stops as flame rod & PCB verify flame
6. When heat exchanger is warm enough, convection room blower circulates warm air into the structure.
7. When filled, the humidifier tray ensures the air is not too dry (if needed)
8. Thermistor & PCB determine gas and fan settings
9. When temperature set point is reached, if needed, gas valves close & combustion fan stops. Convection fan continues to run to cool down unit.
10. When temperature drops, process starts over



Control Panel Review (C-Series models)

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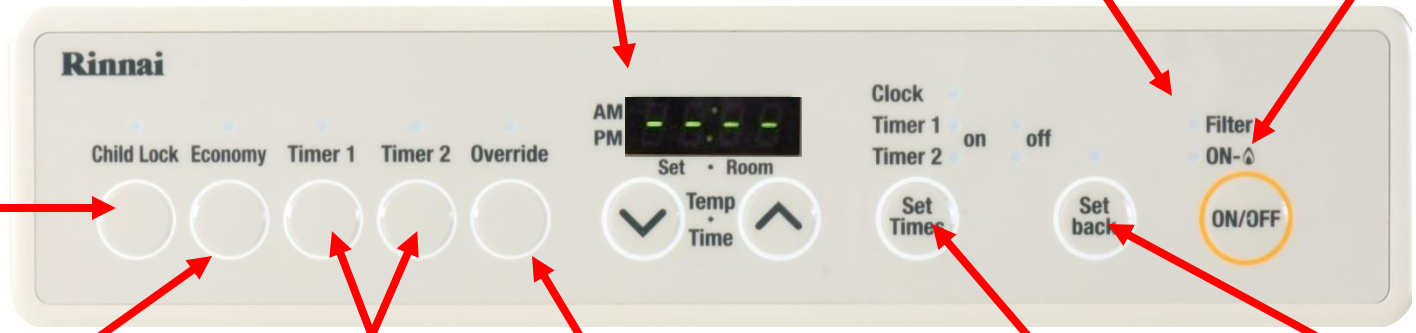
EX08C, 11C, 17C, 22C MODELS

Temperature Control and Display-
Display will enter a power saving dimmer mode during normal operation

Restricted Filter Indicator

Operation Lamp
Green = standby
Solid red = when flame is present
Flashing red = fault code is present



Child Safety Lock

Economy Feature

Timer 1 and 2
Note: While off, pressing Timer 1 and 2 together will change the display from F° to C°

Override
Temporarily bypasses timers

Timer and Clock Setup

Setback Feature

ES38 MODELS Production after 7/2011

Economy Feature

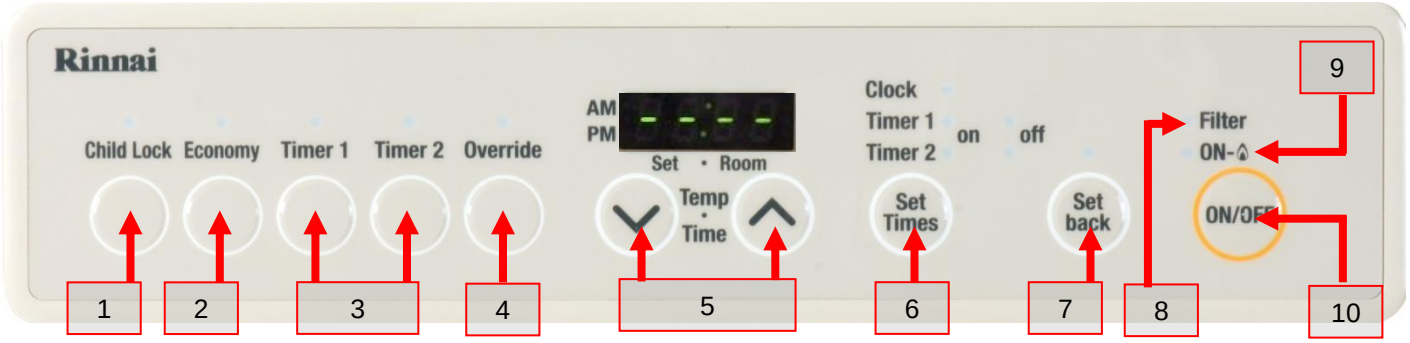
Temperature Control and Display
Room temp lamp stays on
Room temp displays only when adjusted

Function Lock -
Pressing both arrows will engage

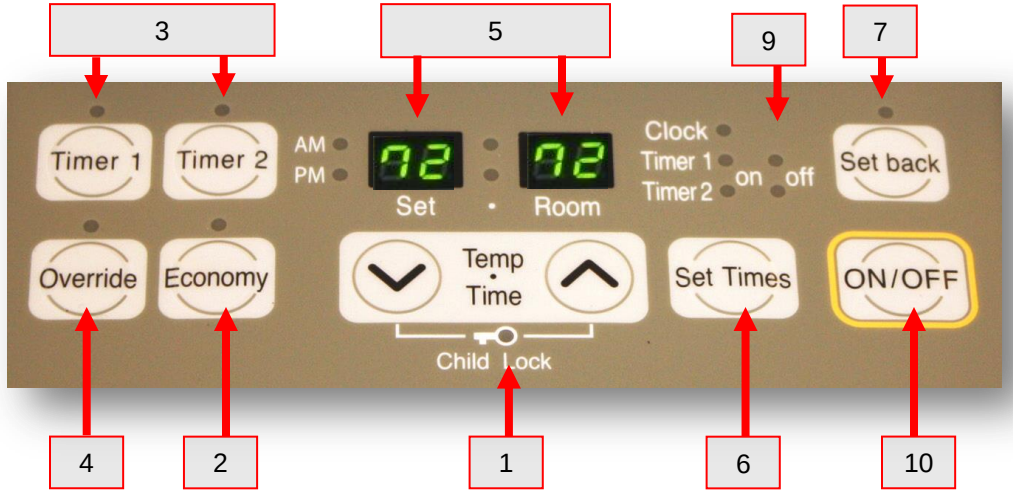
Control Panel Review (C-Series models)

Description Key
The following pages will cover each topic in detail

1. Child Safety Lock
2. Economy Feature
3. Timer 1 and 2
   Note: While off, pressing Timer 1 and 2 together will change the display from Fahrenheit to Celsius
4. Override
   Temporarily bypasses timers
5. Temperature Control and Display-
   Display will enter a power saving dimmer mode during normal operation
6. Timer and Clock Setup
7. Setback Feature
8. Restricted Filter Indicator
   This lamp is on the front panel of the ES38
9. Operation Lamp
   Green = standby
   Solid red = when flame is present
   Flashing red = fault code is present
   This lamp is on the front panel of the ES38
10. On/Off Button



EX08C, 11C, 17C, 22C MODELS



ES38 MODELS (Production after 7/2011)

Control Panel Review (all other current models)

ES38 MODELS
Production before 7/2011

Economy Feature

Temperature Control and Display
Room temp lamp stays on
Room temp displays only when adjusted

Function Lock -
Pressing both arrows will engage

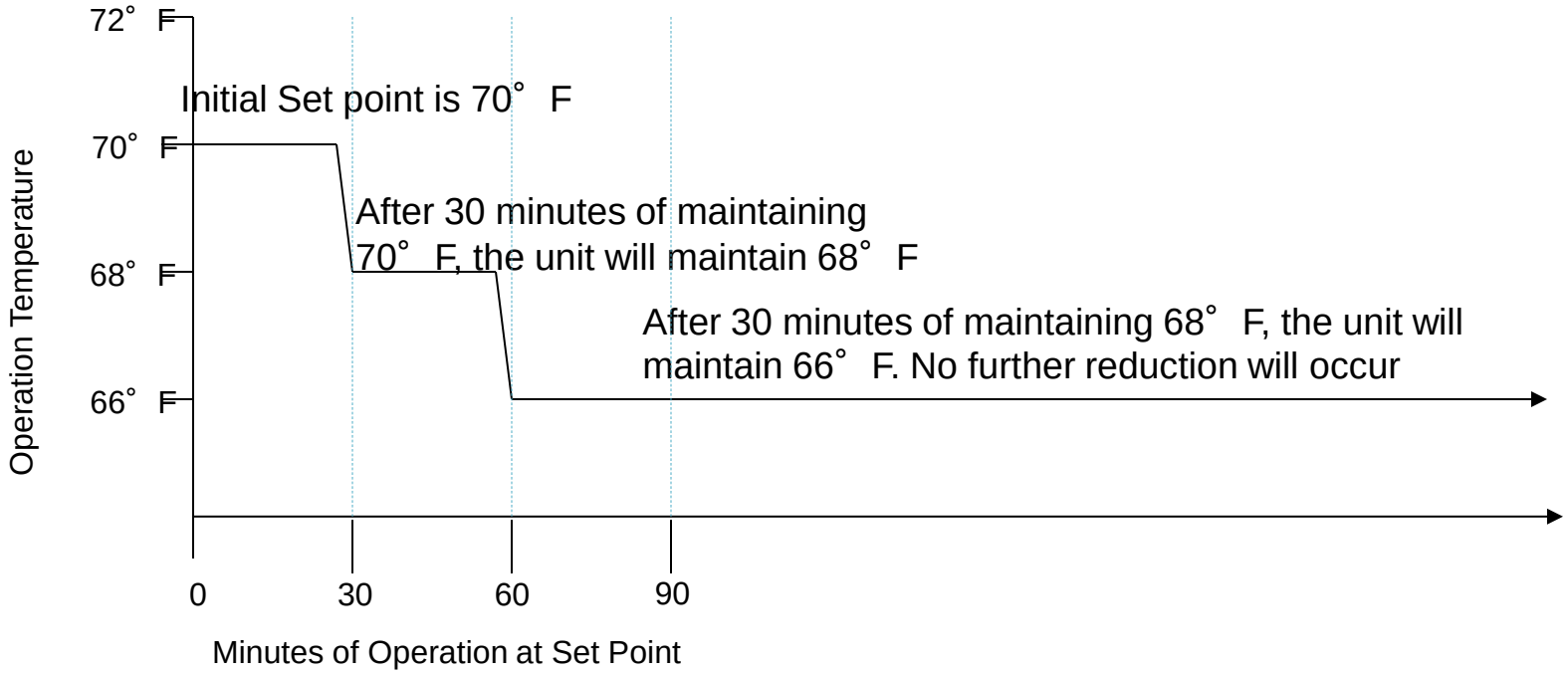
The below table shows the temperature range of all models

Fahrenheit	L (approx. 55)	60	62	64	66	68	70	72	74	76	78	80	H (approx. 95)
Celsius	L (approx. 13)	16	17	18	19	20	21	22	23	24	25	26	H (approx. 35)

Economy Function

Economy Mode is designed to save gas usage over time.

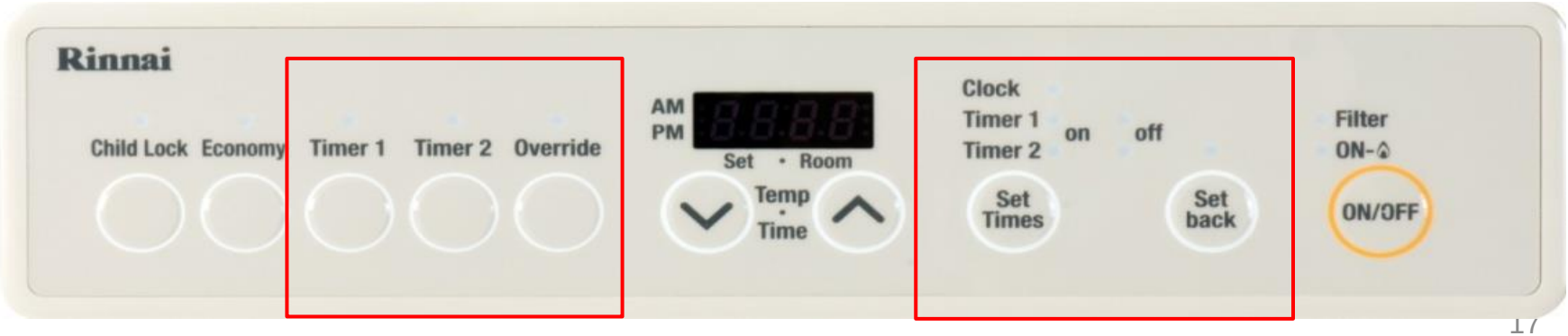
- The Economy Function is based on the theory that the human body cannot detect small temperature changes over an extended period of time.
- 30 minutes after the set point temperature is achieved, the unit will reduce the temperature by 2˚ F. After 30 additional minutes, the unit will reduce the temperature an additional 2˚ F.
- The maximum temperature reduction will not exceed 4˚ F.
- This reduction will not occur if the unit is undersized and cannot maintain the initial set point.


72˚ F
Initial Set point is 70˚ F
70˚ F
After 30 minutes of maintaining 70˚ F, the unit will maintain 68˚ F
68˚ F
After 30 minutes of maintaining 68˚ F, the unit will maintain 66˚ F. No further reduction will occur
66˚ F
Operation Temperature
0
30
60
90
Minutes of Operation at Set Point

Clock, Timer, and Setback Functions (C-Series)

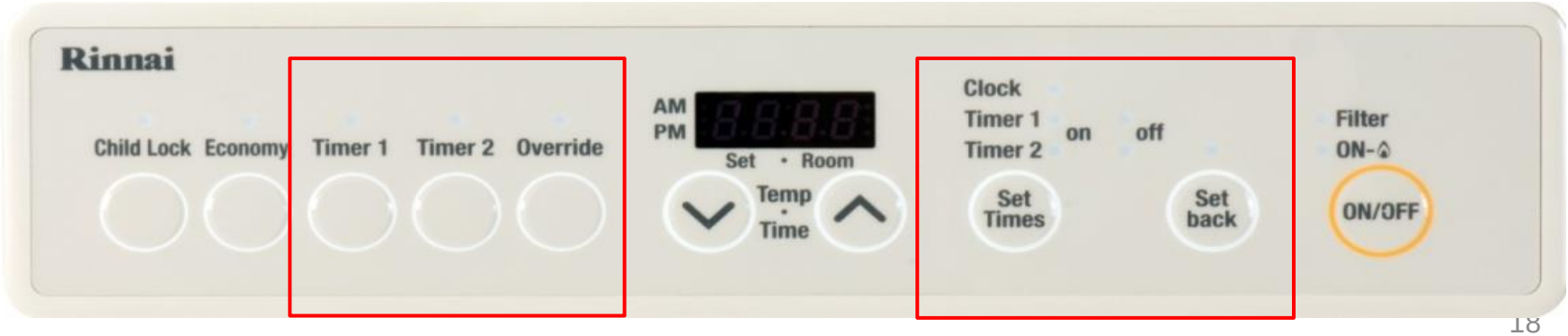
C-Series ENERGYSAVERS® have two primary methods of operation:

- Exclusively as a thermostatically controlled furnace
  - When left to operate on a continuous-run basis using feedback from its thermostat, the ENERGYSAVER will achieve an optimum balance between comfort and efficiency.
- As a programmable furnace with two separate timers and a setback function
  - The timers allow two separate heating events to be set
    - Timer 1 and Timer 2 (individually or both as needed) can then be engaged to allow the unit to turn on and off for those events
    - The ENERGYSAVER is designed to attempt to have the area at the set point temperature when the timer event begins—meaning it could turn on several minutes earlier to achieve set point temperature
    - To set the clock and timers, see the installation manual



Clock, Timer, and Setback Functions (C-Series)

- If needed, the Override button can be selected to temporarily turn on or off the timers to allow manual operation.
- If the unit is operating during a Timer's event, pressing Override will turn the unit off until the next Timer's event.
- If the unit is off between Timer events, pressing Override will turn it on. It will continue to run until the end of the next Timer's event and return to Timer operation.
- If Override is turned off, the unit will return to Timer operation.



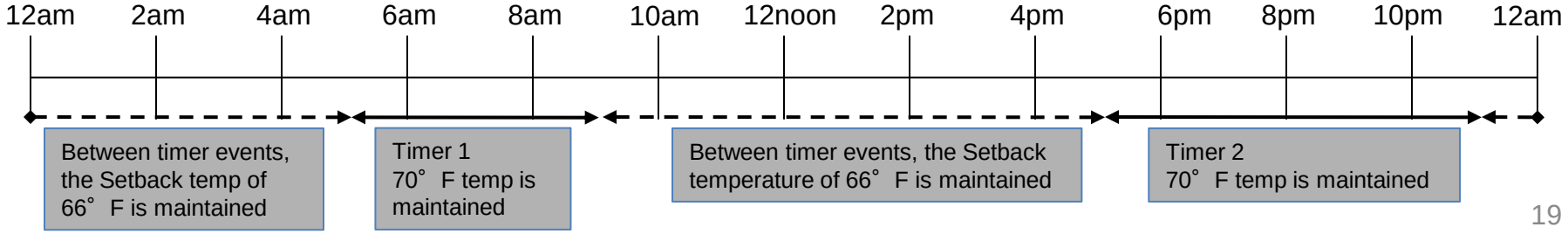
Clock, Timer, and Setback Functions (C-Series)

Setback allows a minimum temperature to be pre-set and maintained between timer events or while the unit is turned off.

- This feature's primary function is to slightly reduce the temperature (and gas usage) during extended periods of nonuse or inactivity—such as sleeping or when the home is empty.
  - NOTE: When this feature is used as a setback function for energy savings, it is not advisable to reduce setback more than 4-6˚ F from the regular set point. This could cause the ENERGYSAVER® to use more gas to return to the set point and cancel any savings achieved.
- This feature can also be used as frost protection during longer periods of vacancy (such as in a second home). For this use the setback temperature can be set as low as 38˚ F.
  - Even when off, if the setback feature is engaged, the setback temperature will be maintained.
  - If power is lost and setback is ON, it will be ON at the resumption of power.

The following example shows how, when used together, the timer and setback functions can maximize comfort and efficiency:

- Daily schedule:
  - Occupants wake at 5am
  - Home is empty from 9am until 4pm
  - Occupants are asleep from 11pm until 5am
- Operation temperature is set to 70˚ F
- Timer 1 is set from 5am to 9am
- Timer 2 is set from 4pm to 11pm
- Setback is set to 66˚ F



Restart Features

All ES, EX, and C-Series models will attempt restart after a power failure or flame failure to ensure heating is not interrupted for extended periods of time.

- If there is a power failure while the appliance is operating, the unit will attempt to restart automatically when the power is restored.
  - The timers will retain their settings after a power outage.
  - After an outage, the clock will retain the time at that moment until power resumes. Therefore, a short power outage (a few minutes) will have virtually no effect on timer operations whereas a longer outage will require the clock to be reset. Dashes will initially display to indicate an outage occurred.

Restart Features

- Should a high gust of wind, gas outage, etc. occur that affects the flame characteristic, the unit will automatically shut down, purge the combustion chamber, and re-ignite.
  - If the unit cannot ignite or maintain flame for 15 seconds after ignition, code 11 will flash and the unit will try to ignite again in one hour.
    - This code will not be stored in the fault code history.
  - If at some point after 15 seconds of established flame the flame fails, the unit will immediately attempt to relight with no code flashing.
    - If the unit cannot relight after this flame failure, code 11 will flash and the unit will try to ignite again in one hour.
    - If the unit continually or intermittently fails to ignite, a qualified service technician may be needed to determine the cause.
  - Each manual has a section named “Restart Function” that explains this procedure.
  - Flame failure fault codes (code 12’s) are no longer needed due to this enhancement.

Fault Codes

- **A fault code will flash on the unit when a fault occurs. The unit will stop operating.**
- **Operation intervention is required for all codes EXCEPT a code 11.**
- **To view the last nine fault codes, with the unit OFF, press the UP, DOWN, and, ECONOMY buttons simultaneously**

CODE	PROBABLE CAUSE	COMMENTS
11	Ignition or Flame failure	Flame current inadequate; Unit will attempt to relight (see Manual-Restart Feature)
14	Overheat Safety Device	Overheat safety bimetal(s) or thermal fuse has activated
16	Over temperature cut off	Room temperature is sensed as being above 104°F for longer than 10 minutes
31	Room temperature thermistor disconnection	Room temperature thermistor open circuit
32	Room temperature thermistor short circuit	Room temperature thermistor wire shorted or touching bare metal
33	High limit thermistor disconnection	High limit thermistor open circuit
34	High limit thermistor short circuit	High limit thermistor shorted or touching bare metal
49	Pressure sensor disconnect or breakdown	Check sensor connection to PCB & hoses to blower motor
53	Abnormal spark sensed	Spark not sensed correctly
61	Abnormal combustion fan motor rpm	Fan speed not achieved within time or goes over speed
62	Convection fan failure	Ensure convection fan can turn freely
70	ON/OFF switch failure	ON/OFF switch connects continuously for more than 15 seconds
71	Solenoid valve check	Solenoid valve(s) (SV1 & SV2) signal and response signal are different
72	Flame rod failure	PCB fails to sense microamps within 20 seconds
73	Communication failure	Data transfer within PCB fails
99	Flue block or venting disconnect	Check intake and exhaust inside and outside for blockage or freezing

Warranty and Maintenance

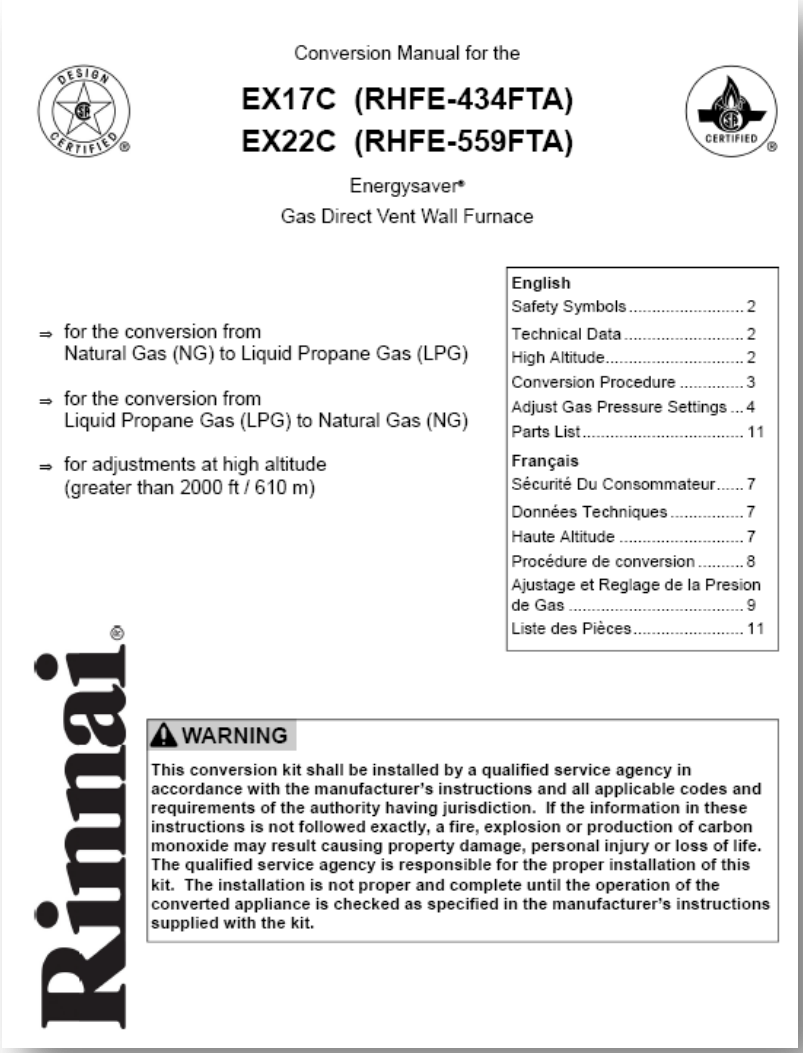
- Warranty

Rinnai ENERGYSAVER® Furnace Warranty		
Heat Exchanger Coverage	Parts	Reasonable Labor
10 years	5 years	2 years
Refer to each model's installation and owner manual for full warranty details		

- Maintenance and Service
  - The appliance should be inspected at least annually by a qualified service technician—see the installation manual for full details.
  - The exterior can be cleaned with a damp, warm cloth.
  - Ensure the vent termination is kept free of snow, ice, or any other obstructions.
  - Ensure the filter(s) are kept clean to ensure proper operation.
    - If the filter(s) become blocked, the filter indicator light will illuminate and the unit will beep every five minutes. If ignored, the unit will eventually cease operation and display a fault code 14.
    - Ensure the unit is OFF while the filter is removed—this will also allow the filter lamp and beep to reset.

High Altitude and Gas Conversion

- All units are approved up to 10,200 feet.
  - The Installation manual and the conversion manual supplied with each unit has instructions for high altitude settings.
  - High altitude conversion does not require additional or replacement parts—only a simple manifold gas pressure adjustment.
  - Only a dual port manometer will be required to complete this adjustment.
- All EnergySaver® furnaces can be field converted from NG to LP or LP to NG.
  - Depending on model and year of manufacture, a conversion kit may be included with the product. If not, contact Rinnai for information on acquiring the proper kit (1-800-621-9419).



Conversion Manual for the

EX17C (RHFE-434FTA)
EX22C (RHFE-559FTA)

Energysaver®
Gas Direct Vent Wall Furnace

⇒ for the conversion from Natural Gas (NG) to Liquid Propane Gas (LPG)

⇒ for the conversion from Liquid Propane Gas (LPG) to Natural Gas (NG)

⇒ for adjustments at high altitude (greater than 2000 ft / 610 m)

English
Safety Symbols 2
Technical Data 2
High Altitude 2
Conversion Procedure 3
Adjust Gas Pressure Settings ... 4
Parts List 11
Français
Sécurité Du Consommateur 7
Données Techniques 7
Haute Altitude 7
Procédure de conversion 8
Ajustage et Reglage de la Presion de Gas 9
Liste des Pièces 11

Rinnai

⚠ WARNING

This conversion kit shall be installed by a qualified service agency in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction. If the information in these instructions is not followed exactly, a fire, explosion or production of carbon monoxide may result causing property damage, personal injury or loss of life. The qualified service agency is responsible for the proper installation of this kit. The installation is not proper and complete until the operation of the converted appliance is checked as specified in the manufacturer's instructions supplied with the kit.

Maximum Temperature Limit

- All ENERGYSAVER® models now have the ability to set a maximum temperature limit directly from the control panel. This procedure is NOT in the manuals to allow property owners and managers to control this setting as needed.

- This is beneficial to landlords and property management to conserve energy and reduce unnecessary gas consumption.

- To perform this adjustment, do the following:

<table>
<tr><th colspan="6">Procedure for Setting Maximum Temperature Limit for ENERGYSAVER Furnaces</th></tr>
<tr><td>ES08,
ES11</td><td>EX08C,
EX11C</td><td>ES17,
ES22</td><td>EX17C,
EX22C</td><td>EX17, EX22
(WTA Models)</td><td>ES38</td></tr>
<tr><td colspan="4">1. While the unit is off, press the “Function Lock” or “Child Lock” and “Up” arrow buttons at the same time for about 3 seconds until the unit beeps</td><td>1. While the unit is off, press the “Economy” and “Select” buttons at the same time for about 3 seconds until the unit beeps</td><td>1. While the unit is off, press the “Economy” and “Up” buttons at the same time for about 3 seconds until the unit beeps</td></tr>
<tr><td colspan="6">2. Select the maximum temperature with the up and down arrows</td></tr>
<tr><td colspan="6">3. Press the On/Off button to save the new setting</td></tr>
</table>

Installation Overview

This overview is not meant as a substitute for the installation and owner's manual. Every furnace is shipped with a manual that should be followed completely. The following is a supplemental presentation and is intended as a tool for the first time installer.

QUALIFIED INSTALLING AGENCY

The installation must conform to local codes, in the absence of local codes, the installation must conform with American National Standard (National Fuel Gas Code) known as NFPA 54 and ANSI Z223.1

- A qualified service technician should install the appliance and inspect it before use.
- Follow all applicable national and local codes. For additional information, see the installation / owner's manual and the product's rating plate.

SAFETY DEFINITIONS

This is the safety alert symbol. This symbol alerts you to potential hazards that can kill or hurt you and others.

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Installation Guidelines

The following guidelines are from the installation / owner's manual. Before beginning the installation process, please review the following:

- A manufactured home (USA only) or mobile home OEM installation must conform with the Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280, or, when such a standard is not applicable, the standard for Manufactured Home Installations, ANSI/NCSBCS A225.1, or the standard for Gas Equipped Recreational Vehicles and Mobile Housing. CSA Z240.4
- Appliance input ratings are based on sea level operation and need not be changed for operation up to 2000 ft (607 m) elevation. For operation at elevations above 2000 ft (609.9), manufactured to specified deration conditions for Canada and the United States. Refer to the high altitude adjustment procedure(s).
- If the flooring is carpet, tile, or other combustible material other than wood, then the appliance must be installed on a metal or wood panel extending the full width and depth of the appliance.

Installation Guidelines

The following guidelines are from the installation / owner's manual.
Before beginning the installation process, please review the following:

- This appliance discharges a large volume of warm air next to the floor. Any particles in the air such as cigarette smoke could cause discoloration in carpet. The warm air flow could discolor nylon carpets containing dyes or vinyl surfaces. To prevent discoloration of the floor covering a mat may be placed under the appliance which extends about 30 inches (750 mm) in front of it.
- This appliance is not designed to be built in.
- This appliance is only for use with the type of gas indicated on the rating plate. This appliance is not convertible for use with other gases unless a certified kit is used. If a conversion of the unit is needed, conversions must be performed by a qualified service provider at the owner's expense.
- This appliance must not be connected to a chimney flue serving a separate solid-fuel burning appliance.
- A shut off valve (and appliance connector valve) should be installed in the upstream of the gas line to permit servicing. This valve is included.

Recommended Tools Needed for Installation

Always wear personal safety equipment when using power tools

Eye protection is required

- Cordless / Electric drill
- 3 inch hole saw
- 5/8 inch X 18 inch pilot drill bit
- 1/8 inch drill bit (not shown)
- No. 2 Phillips bit
- No. 2 Phillips screwdriver
- 2 adjustable wrenches
- Pipe wrench
- Channel locks
- Needle nose pliers
- Side cutters
- Leak detector
- Pipe dope or LP Gas approved Teflon Tape
- Tape measure
- Jig saw

View of Properly Installed Unit

Furnace Packaging and All Hardware

Ensure correct gas type is on package!

All hardware needed for *standard installation is included in package with furnace.

***Included with furnace:**

- Installation and owner's manual
- Wall termination that will fit wall thickness of 4.5"-9.5"
- Wall mounting back spacers
- Mounting screws
- Vent locking clamps
- Wall mounting template included
- ½" Jo-Mar shut-off gas valve
- Packing board to place under unit if installed on carpet **(unit must be installed on an approved surface)**

*** Extension venting, vent covering, and nonstandard wall terminations are available separately**

NOTE: Do not discard or cut into box— the wall template for termination is now on the back side of the cardboard.

Furnace Packaging and Hardware

Inspect packaging to ensure all parts and installation materials are removed before discarding.

Documentation packet contains: installation manual and Warranty registration

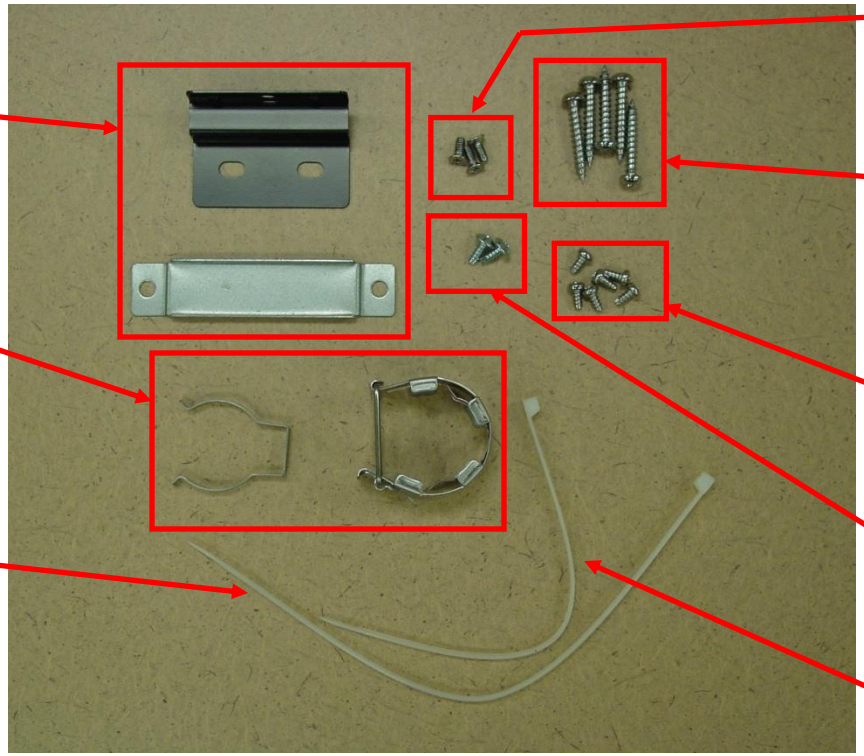
Installer: Leave all documentation with unit
Consumer: Retain all documentation for future use

WARNING **DO NOT USE SUBSTITUE MATERIALS**

USE ONLY PARTS CERTIFIED WITH THE APPLIANCE

Furnace Packaging and all Hardware

HARDWARE PACKET



Back spacer mounting brackets

Exhaust pipe stoppers and clamps

Longer tie wrap for securing intake hose to back frame

Machine screws for attaching exhaust pipe to termination sleeve

Screws for attaching exhaust sleeve (3) and top back spacer (2) to wall

Sheet metal screws for attaching back spacers to furnace

Sheet metal screws for attaching air intake clamps (not used on all models)

Shorter tie wrap for securing air intake hose to termination

CAUTION **Use the pipe stoppers, connectors, clamps, and screws according to the installation instructions in order to ensure no leakage of exhaust gases.**

Installing On Combustible Flooring

- When the furnace is installed directly on carpeting or other combustible material (excluding wood flooring), it must be installed on a metal or wood panel extending the full width and depth of the heater.
- The furnace may be installed on combustible wood flooring.

1. The packing board used for shipping can also be used to place under the unit if needed when installing on carpet.

2. Place furnace on board
   - Remove toe plate from furnace
   - Mark board to fit under furnace with no visible excess.

3. Cut board to fit full width of unit.

CAUTION

Practice good safety habits when using power equipment

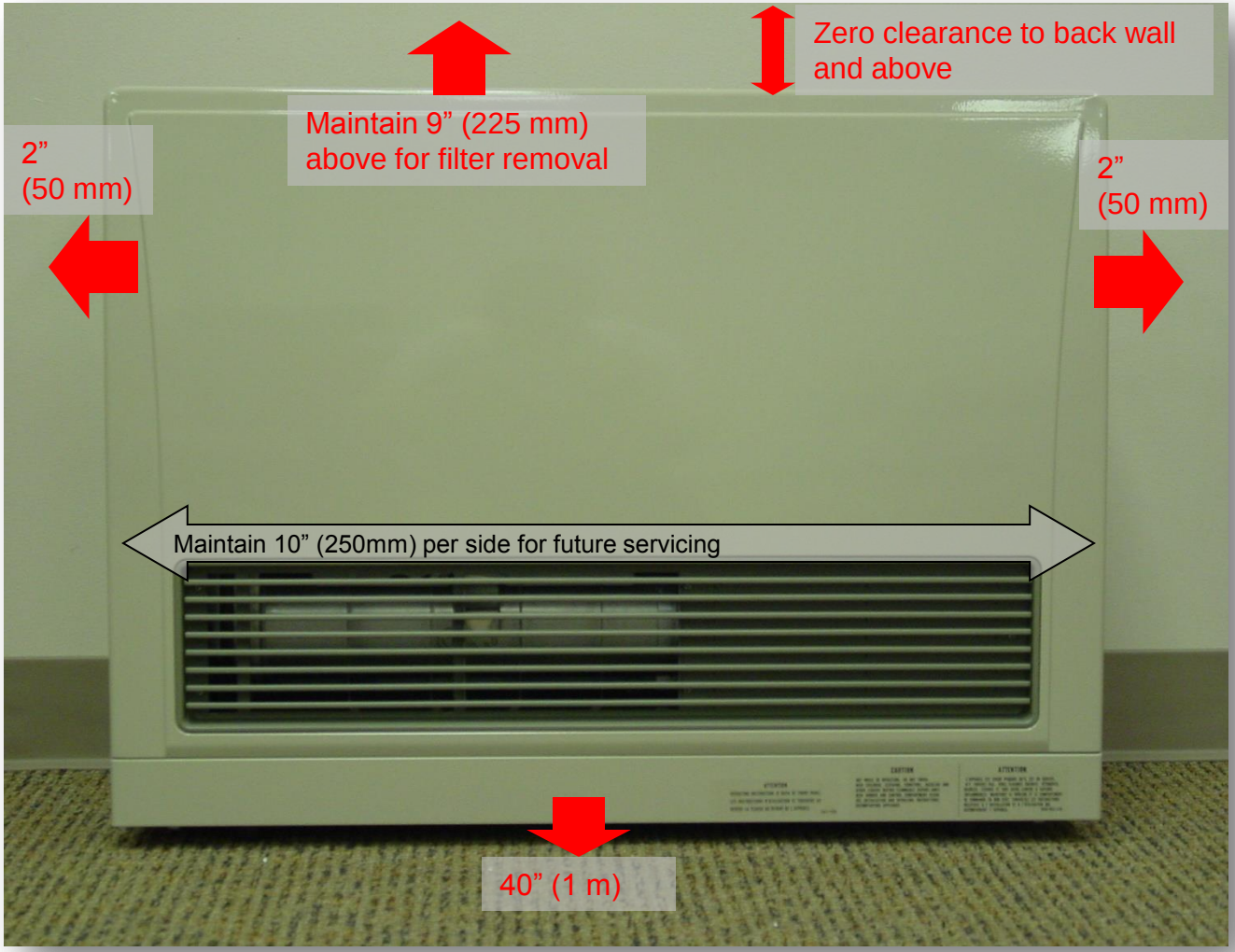
Identifying the Installation Location

Rinnai

FURNACE LOCATION

Furnace must be installed where the proper clearances from combustibles can be maintained.

Also ensure installation location is not in an area of excessive cold or warm air conduction.


Zero clearance to back wall and above
Maintain 9” (225 mm) above for filter removal
2” (50 mm)
2” (50 mm)
Maintain 10” (250mm) per side for future servicing
40” (1 m)

Identifying the Installation Location

VENT LOCATION

Consider the following requirements when locating the outside vent termination:

- 12” clearance from grade or anticipated snow level (ANSI Z223.1)
- 9” clearance from a door or window that may be opened (ANSI Z223.1)
- 3 feet clearance above a forced air inlet located within 10 feet (ANSI Z223.1)
- Any other local, state or national code requirements
- Avoid vent locations over public walkways or near dryer vents
- Ensure any wall drilling will not compromise support studs, existing electrical, plumbing, or HVAC systems, etc.

24” from any flammable obstruction
10” from any non-flammable obstruction
20” from any obstruction
20” from any obstruction
12” from grade or snow level
24” from an opposing wall

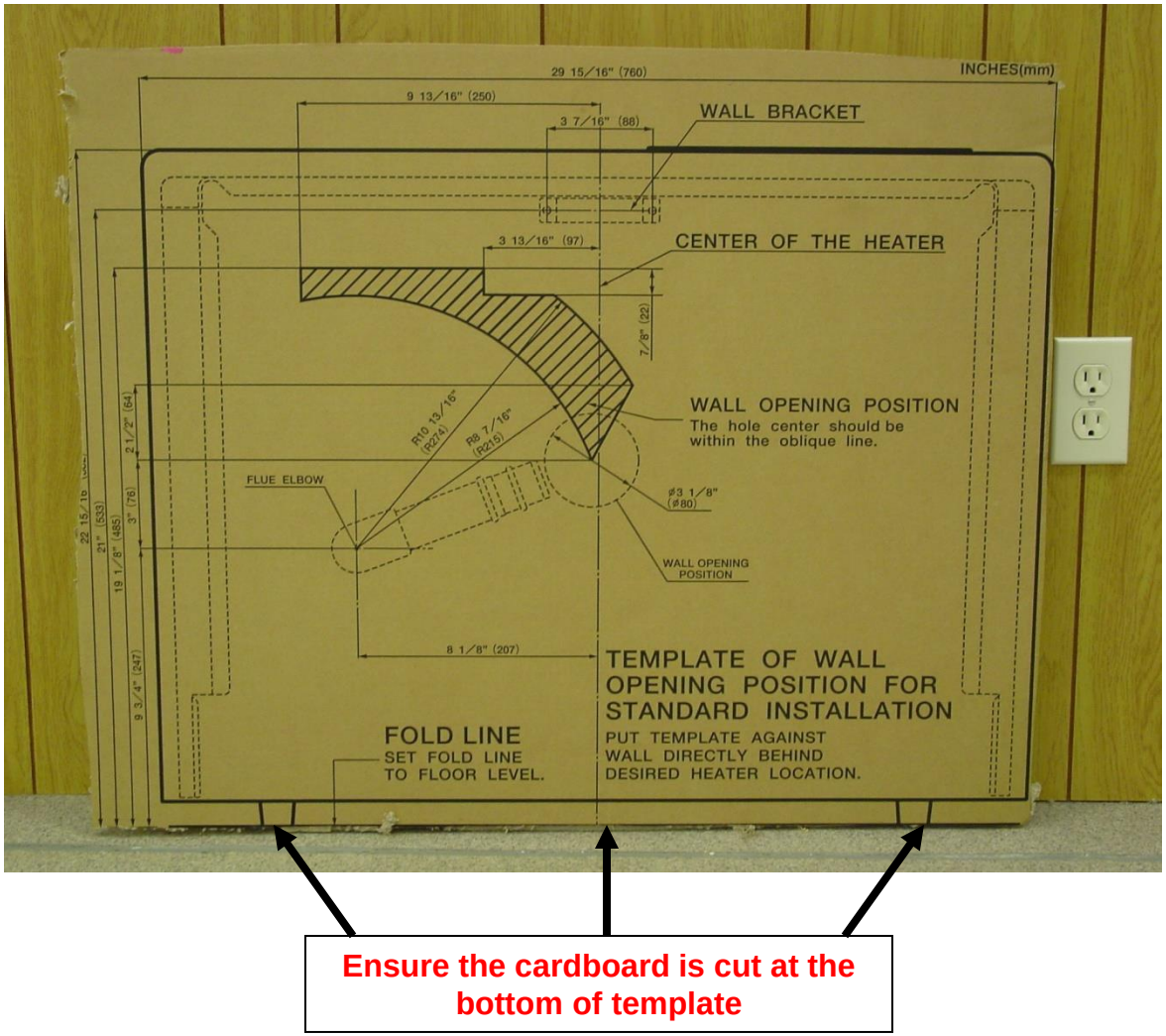
Interior Wall Preparation

Rinnai

TEMPLATE PLACEMENT

Included with each furnace is a wall template to simplify mounting and vent hole location—2010 and newer models have the template printed on the cardboard packaging.

1. Cut the template out of the box.
2. Ensure bottom of template is cut correctly.
3. Temporarily tape the template to the wall at floor level.
4. Ensure template does not slip.

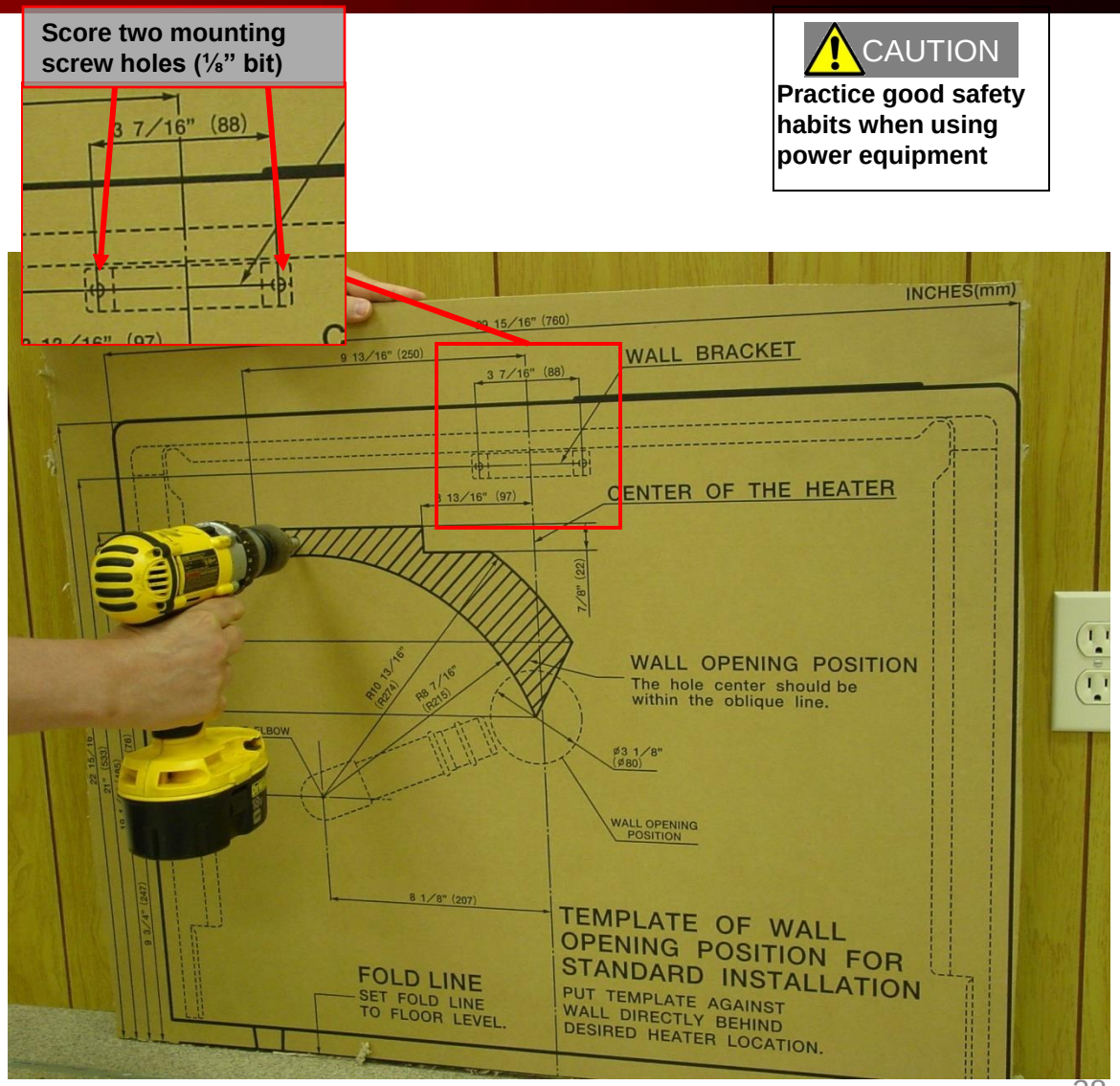


Ensure the cardboard is cut at the bottom of template

Interior Wall Preparation

SCORING THE WALL

1. Ensure vent hole will NOT compromise any structure support (stud), electrical, plumbing, HVAC system, etc**.**
2. Score the template anywhere in the shaded arc for the pilot bit.
3. Also score the two screw holes for the mounting wall bracket with a ⅛” bit.
4. Drill the vent hole with a pilot bit long enough to extend through the entire wall and no larger than the center bit of the hole saw being used.


Score two mounting screw holes (⅛” bit)
3 7/16" (88)
INCHES(mm)
WALL BRACKET
CENTER OF THE HEATER
WALL OPENING POSITION
The hole center should be within the oblique line.
WALL OPENING POSITION
TEMPLATE OF WALL OPENING POSITION FOR STANDARD INSTALLATION
PUT TEMPLATE AGAINST WALL DIRECTLY BEHIND DESIRED HEATER LOCATION.
FOLD LINE
SET FOLD LINE TO FLOOR LEVEL.

CAUTION

Practice good safety habits when using power equipment

INSTALLING THE MOUNTING BRACKET

Using the two previous scored screw holes, mount the rear mounting bracket to the wall.

Interior Wall Preparation

DRILLING THE VENT HOLE

1. **Interior:**
   Using a 3” inch hole saw, drill the vent hole guided by the previously drilled pilot hole.

NOTE: Drill holes level or sloped downward 2˚ to the outside. Vent termination must have outward pitch to ensure condensation drains to the outside.

2. **Exterior:**
   Continue drilling hole guided by the previously drilled pilot hole.

Initial Gas Line Preparation

ATTACHING THE GAS CONNECTION (Part 1)

1. Prepare the drip leg for furnace connection. **NOTE: Do not attach the right side back spacer yet to allow enough space for tightening these fittings.**

2. Attach the drip leg to the furnace. Use two wrenches to prevent damage to the furnace.

3. If using appliance flex gas line (recommended), attach flair adaptor to the drip leg. **NOTE: The connection of the flexible gas line will be covered in a following procedure.**

IMPORTANT: Ensure all code and gas line sizing requirements are followed!
All connections should be properly tightened and sealed with pipe dope or Teflon tape.

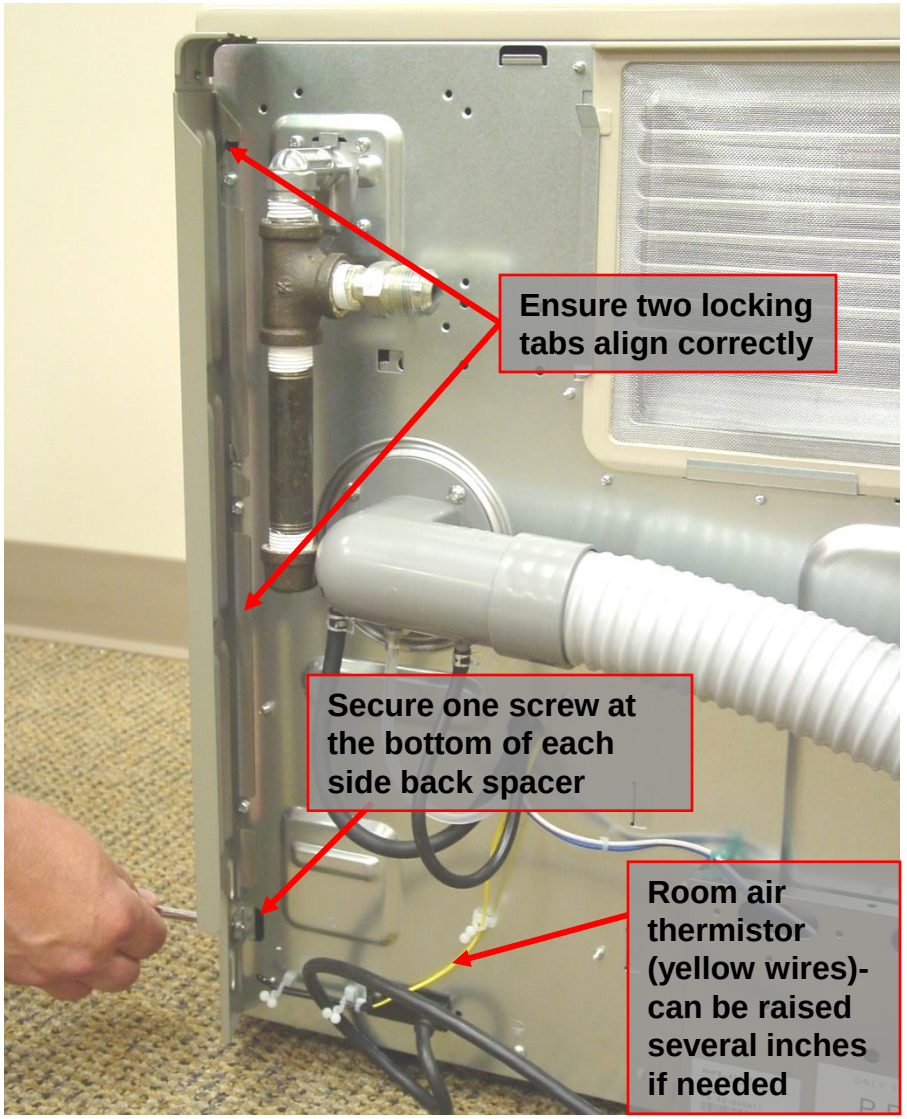
Furnace Preparation

INSTALLING THE LEFT AND RIGHT BACK SPACERS

The left and right back spacers are installed with a tab and slot at the top and middle and single screws at the bottom of the panels.

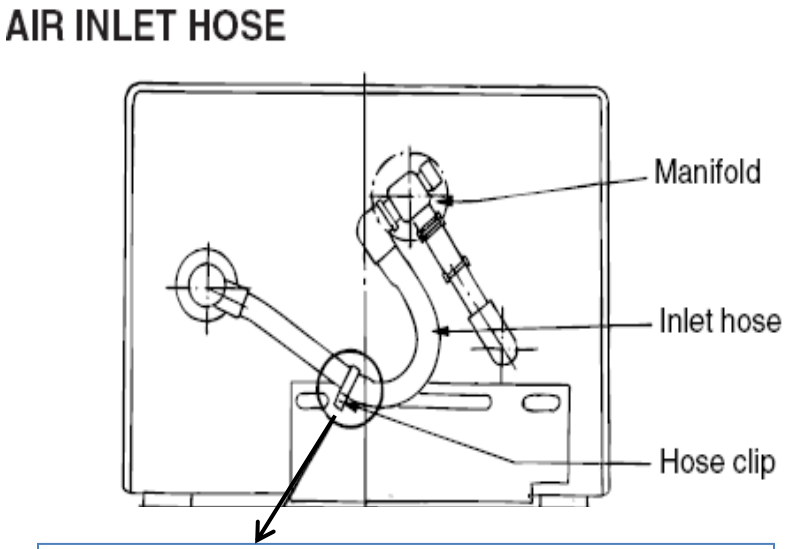
ROOM AIR THERMISTOR

NOTE: The room air thermistor comes with approximately 14” of wire. It can be moved higher if needed if there is an excessive amount of cold air conduction present. This should be a last resort—ideally, the cold air conduction should be eliminated.

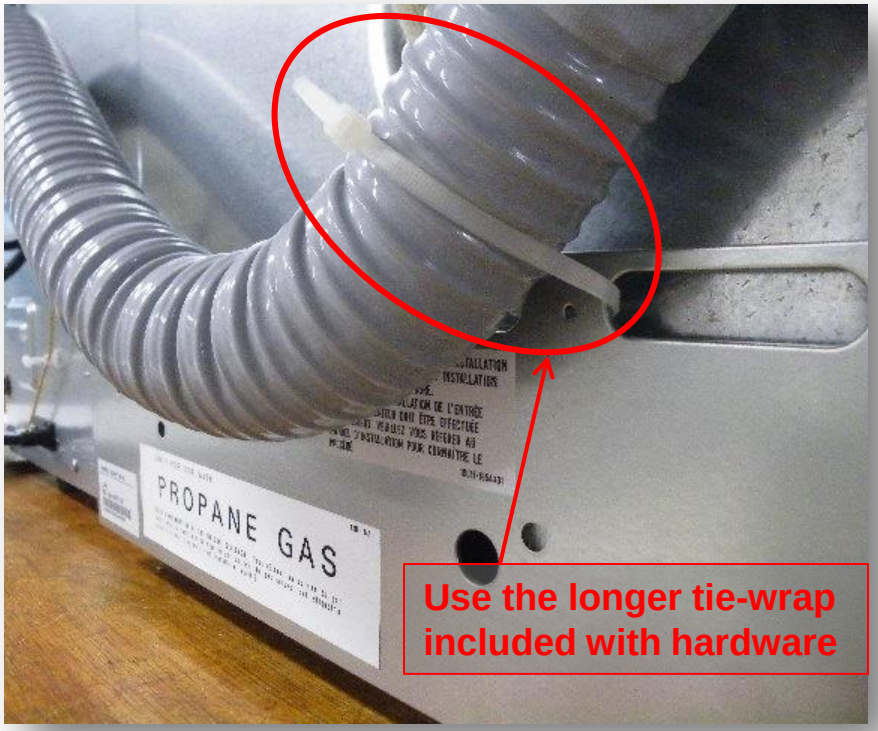

Ensure two locking tabs align correctly
Secure one screw at the bottom of each side back spacer
Room air thermistor (yellow wires)- can be raised several inches if needed

INSTALLING THE AIR INTAKE HOSE CLIP

Mount the hose clip at the bottom of the furnace as shown below.



Models prior to 2010 use a clip in this location-see manual for details.

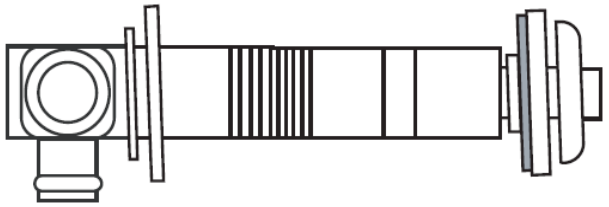


Vent Termination

VENT TERMINAL PREPARATION

- The flue manifold (vent) must exhaust to the outside. Do not exhaust into other rooms.
- The flue is not designed to be positioned under floors or below the furnace.
- Clearance to combustibles for the vent sleeve and flanges is zero inches.
- This appliance can only be used with one of the five types of Rinnai vent kits. These kits and their dimensions are listed below and in each owner's/installation manual.

NAME	KIT NUMBER	KIT WALL DIMENSIONS
S Vent Kit	FOT-150	3"-4 ½" (75 – 115 mm)
*A Vent Kit	FOT-151	4 ½"-9 ½" (115 – 240 mm)
B Vent Kit	FOT-152	9 ½"-15 ¾" (240 – 400 mm)
C Vent Kit	FOT-153	15 ¾ -23 5/8" (400 – 600 mm)
D Vent Kit	FOT-154	23 5/8"-31 ½" (600 – 800 mm)

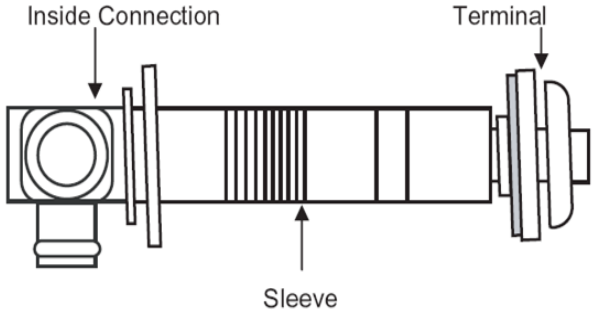


*Vent Kit A (FOT-151) is included with each furnace

Vent Termination

FLUE MANIFOLD DISASSEMBLY

- The flue manifold consists of 3 parts:
  - Inside connection
  - Sleeve
  - Outside terminal



1. Disassemble the flue manifold by first pulling out the inside connection.

NOTE: Make sure the black gasket is always on the interconnector piece as shown.

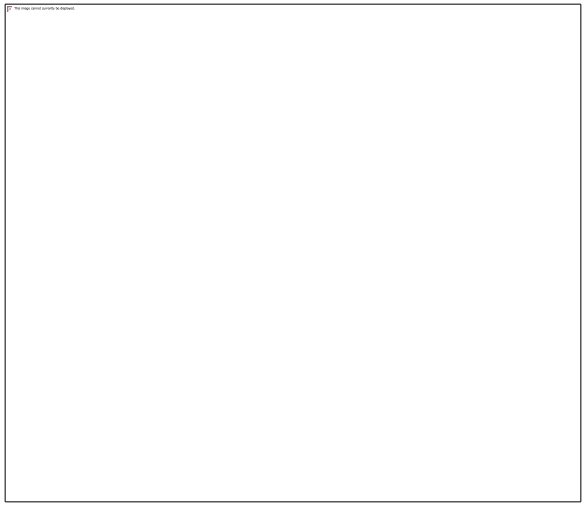
2. To remove the outer terminal pull and release the two internal stainless steel ties and then pull out the outer terminal.

Vent Termination

ADJUSTING THE SLEEVE LENGTH

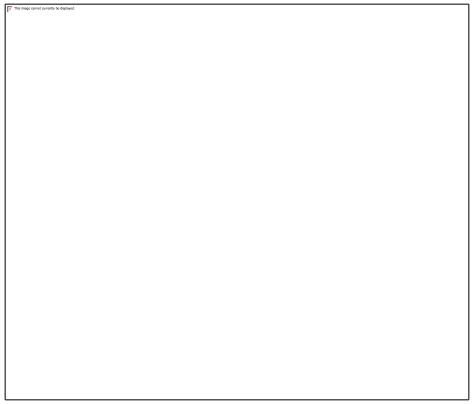
1. Measure the wall thickness through the previously drilled hole. The end of the sleeve should protrude 3/16” – 3/8” (5-10mm) from the outside wall. The sleeve is threaded for adjustment. Adjust the sleeve length to wall thickness PLUS 3/16” – 3/8”(5-10mm). **NOTE: Do not extend beyond the red line on the sleeve.**

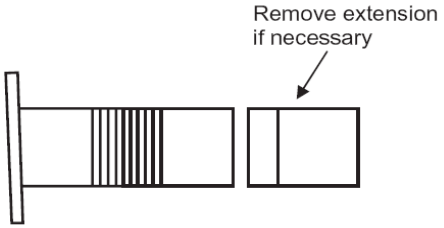
CAUTION **Practice good safety habits when using sharp tools!**



2. If a shorter length is necessary an extension can be removed. Cut the plastic at the pre-existing mark and remove the extension.

NOTE: Vent Kit “S” does not have the removable extension



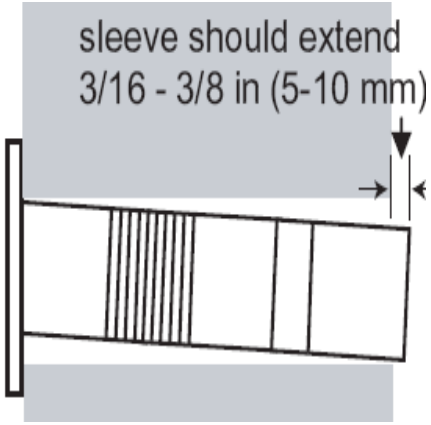


IMPORTANT:
Only cut the plastic green film with a knife. The vent itself is NOT designed to be cut!

Vent Termination

ATTACHING THE SLEEVE

1. Slide the sleeve through the interior side of hole. Ensure label “Top” is installed at the top of hole.



2. Ensure the sleeve extends 3/16” to 3/8” (5-10 mm)

NOTE: The flange is offset 2° to allow condensate to drain outside

3. Attach the sleeve to the inside wall using 3 screws. If needed, use sheet rock anchors to secure to wall.

CAUTION **Practice good safety habits when using power equipment tools!**

Vent Termination

INSTALLING THE OUTER VENT TERMINAL

1. From the outside, insert the terminal into the sleeve with the marking “TOP” at the top. The left hand side locking tie should be marked “LEFT.”

2. For weather board walls (lap siding), add the second seal next to the terminal seal to compensate for siding angle.

3. On the inside, pull hard on the left and right hand ties. Clip the ties over the notches inside the sleeve. The ties should pull 2 or 3 notches past the starting point.

4. Cut the ties, leaving about ¾” (20mm) past the notch. Bend the excess back and parallel to the wall.

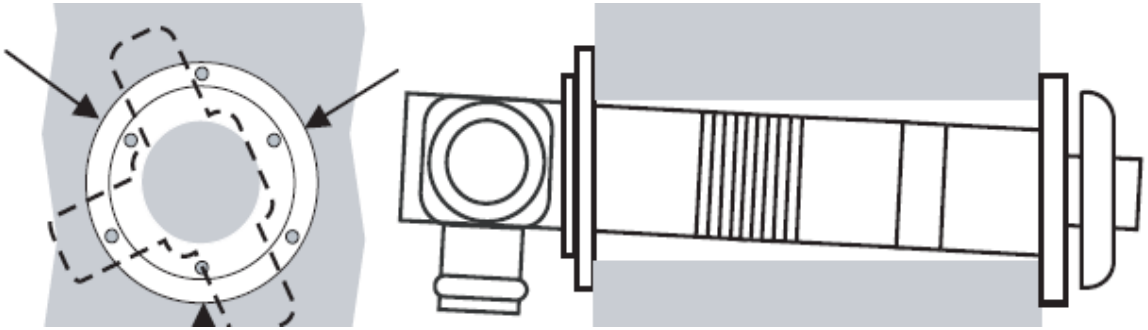
CAUTION **Practice good safety habits when using power equipment and sharp tools!**

Vent Termination

INSTALLING THE INSIDE CONNECTION ASSEMBLY

1. Push the assemble into the terminal tube with the label “top” matching the location on the sleeve. Ensure that the seal is in place on the inner tube.

2. Attach the inside connection with 3 screws.



NOTE: The inner connection can still be turned to install the screws.

Vent Termination

OUTSIDE VIEW OF CORRECTLY INSTALLED TERMINATION

Final Gas Line Preparation

ATTACHING THE GAS CONNECTION (Part 2)

Tip: Using a flexible appliance gas line will enable the furnace to be slid into place with minimal effort.

1. Ensure all connections are properly tightened and sealed with pipe dope or Teflon tape.

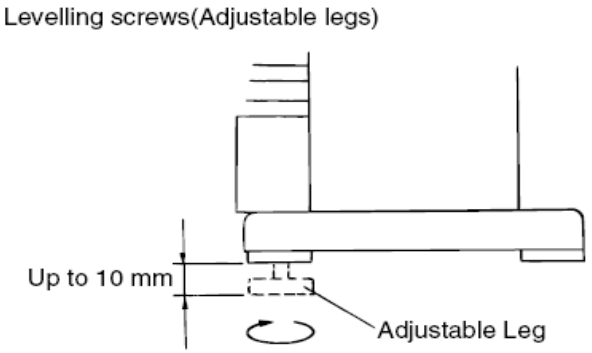
2. Attach the included shut off valve and field supplied flexible gas line to the wall supply and furnace. Leak test all connections.

3. NOTE: Many models will allow the gas valve to be positioned behind the back spacer but still accessible by the consumer.

IMPORTANT: Ensure all code and gas line sizing requirements are followed. Shut off valve should be located in a manner that allows the unit to be removed for field service.

NOTE: If flexible gas line is not used, first complete the next step (sliding the furnace into place), then attach gas line accordingly.

SLIDING THE FURNACE INTO PLACE

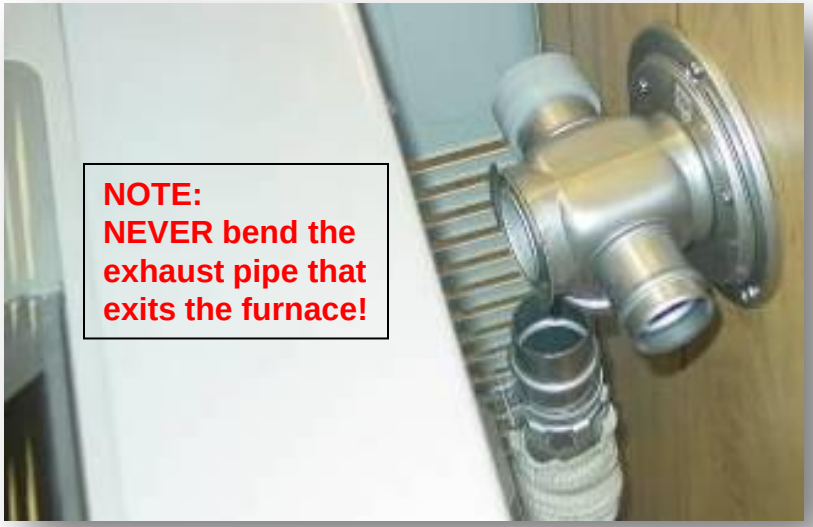


1. If necessary, the unit can be leveled using the adjustable legs under the front right and left hand sides.

2. Slide the furnace into place. Ensure furnace is level and aligned to vent termination, back spacer mounting bracket, and gas line (if necessary).

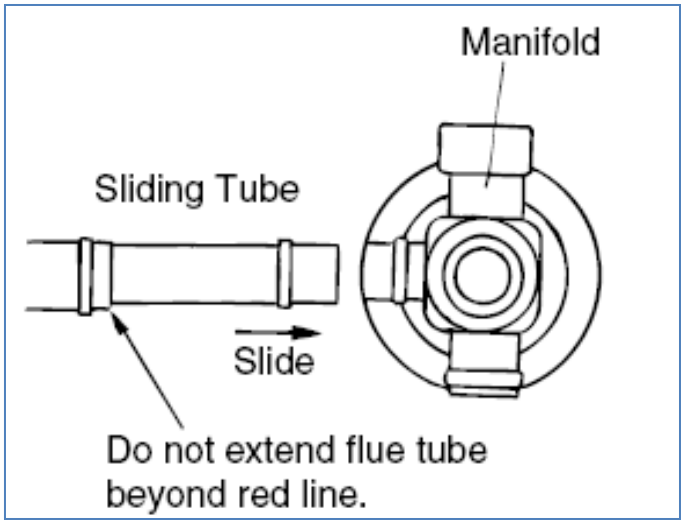
CONNECTING THE VENT FLUE

The following components can be connected by reaching behind the appliance as it is positioned against the wall



1. Slide the stainless steel exhaust tube until it is fully inserted into the manifold.

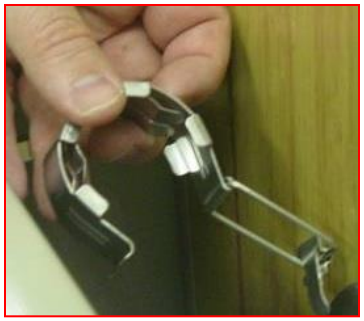
NOTE: Never bend the exhaust pipe that exits the furnace.

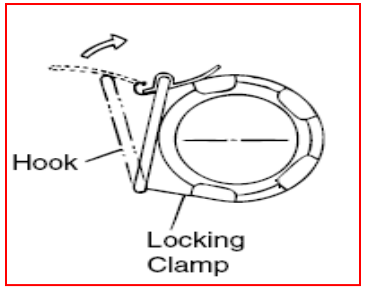


2. When sliding the tube, ensure it does not extend beyond the red line.
3. Connect the flue outlet to the manifold.

CONNECTING THE VENT FLUE (continued)

The following components can be connected by reaching behind the appliance as it is positioned against the wall



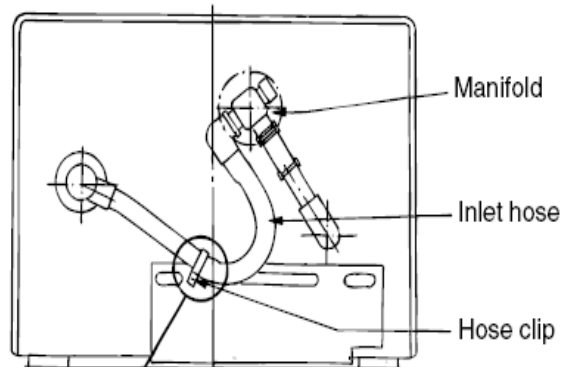


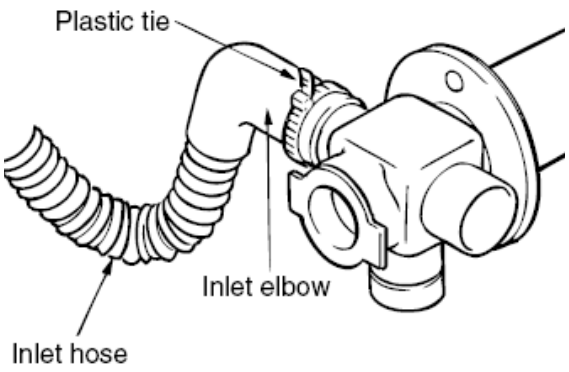
3. Fit the locking clamp over the connection between the sliding tube and manifold. Engage the hook and rotate it until it snaps against the body of the clamp.

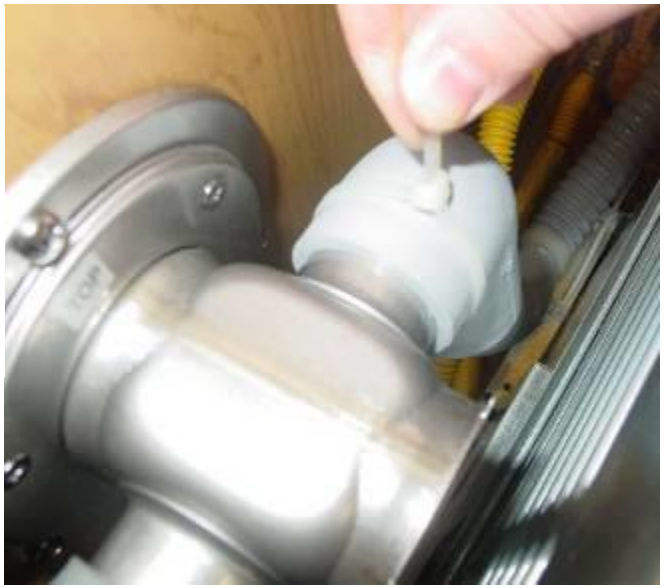
4. Slide the insulation sleeve up to the flue manifold. Slip the securing clips over the sleeve as shown.

CONNECTING THE AIR INTAKE

The following components can be connected by reaching behind the appliance as it is positioned against the wall:







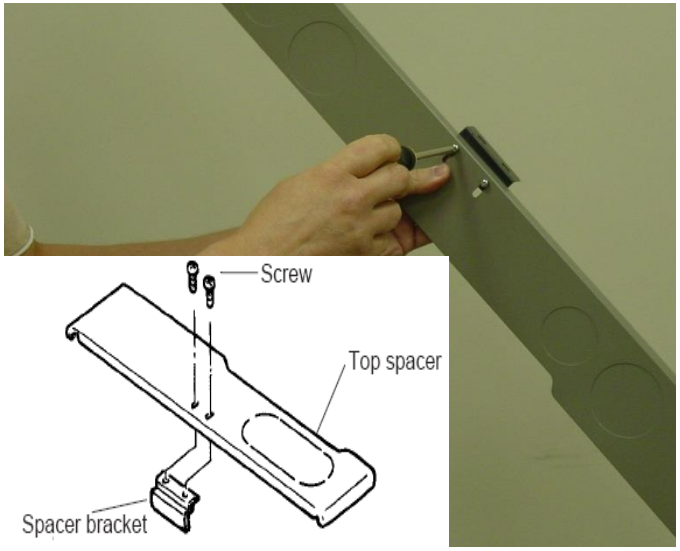
1. Connect the air intake hose to the side of the termination.

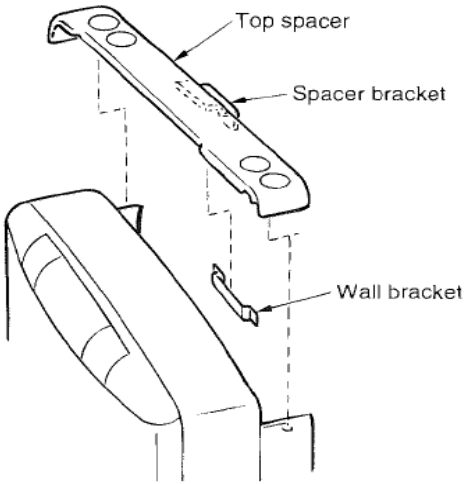
   NOTE: NEVER cut the gray air intake hose. It is sized to length for a standard termination.

2. Using the zip tie provided, fasten the air intake to the termination.

Installing the Top Back Spacer

The following components can be connected by reaching behind the appliance as it is positioned against the wall.





1. Install the bracket on the rear of the top spacer with 2 decorative sheet metal screws.

2. Place top back spacer on the back of furnace, clipping the spacer bracket into the wall bracket.

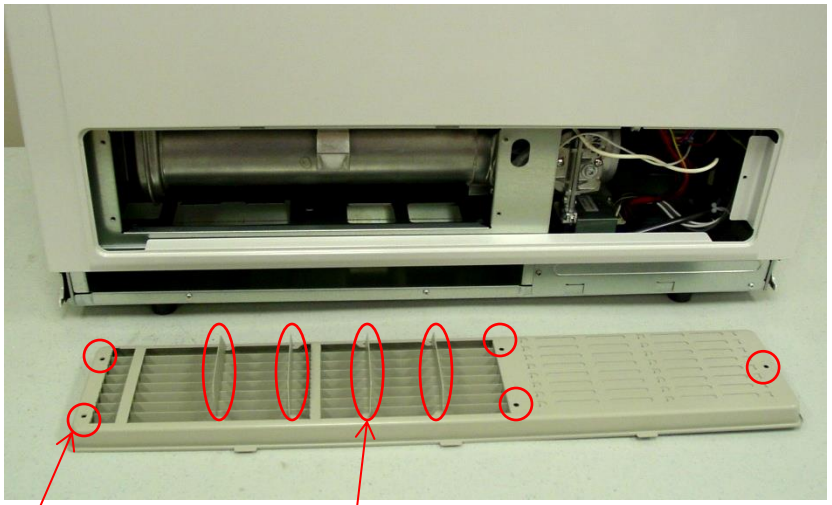
Installing the Top Back Spacer (continued)

1. Insert screws for top spacer on right and left side of back spacers.

2. Tighten two sheet metals screws on top back spacer.

Prepare for Operation

1. If needed remove the toe kick plate to fill the humidifier tray.
2. Fill the humidifier tray according to the installation manual. Replace toe kick plate.



5 screws secure louver plate

Vertical louvers can be gently turned to direct air flow

1. To direct air flow, if needed, the front louvers can be adjusted after removing louver plate (5 screws).
2. Install the filter.
3. Open all gas valves.
4. Turn unit on and set temperature.
5. Educate consumer on use and care.

ES38 Vent and Gas Connection Differences

Shipped with each ES38 is a vent adaptor that reduces the 50 mm diameter exhaust to 30 mm for connection to vent termination.
NOTE: If using extension sets, this reducer must be connected to the VENT TERMINATION ONLY! Do not use the smaller extension sets with this reducer installed at the furnace. The ES38 will not operate correctly.

Included with the ES38 is male to female “street” elbow to attach to the unit before a union or flex line. This allows the installer to select the direction in which the gas line will be connected.

Extended Venting And High Altitude Installation Procedures

Vent Extension Installation Requirements

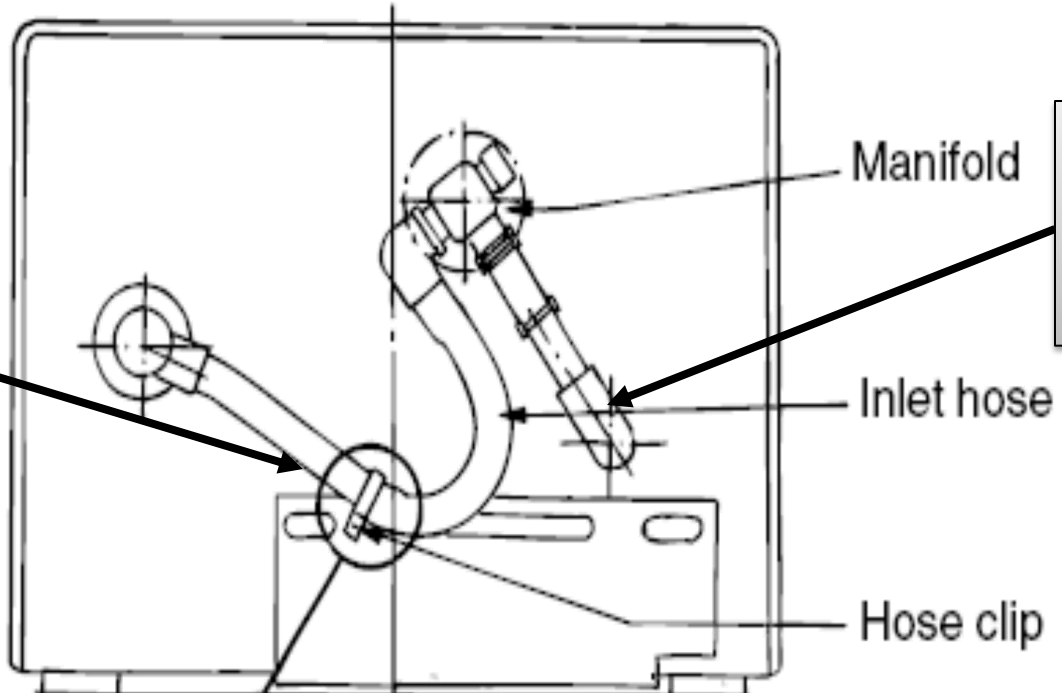
The following is an overview of guidelines and installation of Rinnai Direct Vent Furnace vent extensions. This is not a substitute for any current installation / owner's manual or vent instructions.

- The 08 series can not use vent extensions.
- See each model's owner's / installation manual for permissible vent lengths.
- The vent termination must ALWAYS be horizontal.
- Vent extensions installed in ANY unconditioned air space MUST be insulated with high temperature insulation and must be accessible.
- All pipe stoppers, connectors, screws and hangars must be used in accordance to their instructions. The seals must be air tight for both the intake and exhaust air supply hoses.
- The intake air hose must equal the exhaust hose length to maintain a balanced flue system.
- The humidifier trays are made of enamel covered steel to resist rust and corrosion from the condensate draining back to the unit.
  - The 38 series tray cannot be removed from the unit.
  - The 08, 11, 17, and 22 series trays can be removed for cleaning but must be replaced before operation of the unit.
- Overflow of the humidifier tray is an indication that the venting extension was possibly installed incorrectly. No warranty claim will be approved covering overflow.

Vent Extension Installation Requirements

The following is an overview of guidelines and installation of Rinnai Direct Vent Furnace vent extensions. This is not a substitute for any current installation / owner's manual or vent instructions

- The exhaust elbow assembly attached on the back of the unit must remain as a 90˚ elbow. Never bend or straighten this component.
- Do not shorten the intake air hose attached to unit from factory.



This hose can never be cut or altered in length. The extension that is added to this hose can be cut.

The exhaust elbow exiting the unit should never be straightened (although it appears it may be possible).

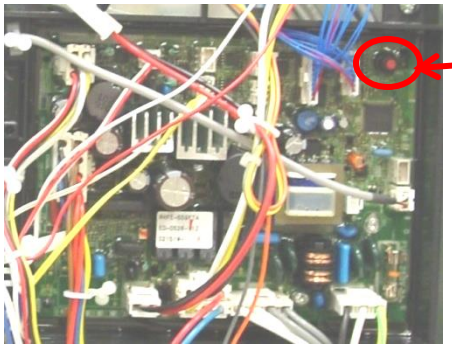
Specific Venting Changes

- The table below illustrates each model's permissible vent length and kit part numbers

MODEL		ES08/EX08C	ES11/EX11C	ES17/EX17(C) ES22/EX22(C)	ES38
Extended Vent Guidelines	Total extended vent limit	0	13 feet	13 feet	13 feet
	Total vertical limit	0	8 feet (unless greater than 2000' altitude then only 5' for the ES11	10 feet	13 feet
Type of Extended venting kit needed	12" to 20" (0.3-0.5m) extension from exhaust to termination	The 08 series can not use extensions	Use kit FOT-155	Use kit FOT-219	Use kit FOT-102
	21" to 40" (0.5-1m) extension from exhaust to termination		Use kit FOT-156	Use kit FOT-220	Use kit FOT-103
	61" to 80" (1-2m) extension from exhaust to termination		Use kit FOT-157	Use kit FOT-221	Use kit FOT-114
	Standard bent elbow (can be straightened for extensions less than 12")	Use kit FOT-158 (only 1)	Use kit FOT-158	Use kit FOT-158	Use kit FOT-115
	Long bent elbow (can be straightened for extensions less than 24")	Not available for the ES08	Use kit FOT-190 or FOT-201	Use kit FOT-190 or FOT-201	Not available for the ES38
			FOT-201 now includes an intake hose . It replaces FOT-190		

- Each extension kit comes with piping, mounting hardware and pipe connection accessories.
- See the installation / owner's manual for a complete listing for the kit contents and detailed installation instructions.
- No more than two (2) elbows may be used on any furnace.

PCB Adjustments for extended venting or high altitude

MODELS: EX08C, EX17C, EX22C, ES38		
These models do not require an adjustment for vent length—only for high altitude		
With power off, remove front cover and press the test button on the PCB. Use the temperature arrows on the control panel to set as follows		
NG	For installations from 0-2000’ above sea level	**Set code to A1* or A5**
	For installations from 2001-5200’ above sea level	**Set code to A2 or A6**
	For installations from 5201-7700’ above sea level	**Set code to A3 or A7**
	For installations from 7701-10,200’ above sea level	**Set code to A4 or A8**
LP	For installations from 0-2000’ above sea level	**Set code to L1* or L5**
	For installations from 2001-5200’ above sea level	**Set code to L2 or L6**
	For installations from 5201-7700’ above sea level	**Set code to L3 or L7**
	For installations from 7701-10,200’ above sea level	**Set code to L4 or L8**

*default setting

PCB Adjustments for extended venting or high altitude

MODEL: EX11C			
With power off, remove front cover and press the test button on the PCB. Use the temperature arrows on the control panel to set as follows (See the previous slide for an illustration)			
NG	For installations from 0-2000’ above sea level	with a vent length of 0 to 7 ft	**Set code to A1***
		with a vent length of 7 to 13 ft	**Set code to A5**
	For installations from 2001-5200’ above sea level	with a vent length of 0 to 7 ft	**Set code to A2**
		with a vent length of 7 to 13 ft	**Set code to A6**
	For installations from 5201-7700’ above sea level	with a vent length of 0 to 7 ft	**Set code to A3**
		with a vent length of 7 to 13 ft	**Set code to A7**
	For installations from 7701-10,200’ above sea level	with a vent length of 0 to 7 ft	**Set code to A4**
		with a vent length of 7 to 13 ft	**Set code to A8**
LP	For installations from 0-2000’ above sea level	with a vent length of 0 to 13 ft	**Set code to L1* or L5**
	For installations from 2001-5200’ above sea level	with a vent length of 0 to 13 ft	**Set code to L2 or L6**
	For installations from 5201-7700’ above sea level	with a vent length of 0 to 13 ft	**Set code to L3 or L7**
	For installations from 7701-10,200’ above sea level	with a vent length of 0 to 13 ft	**Set code to L4or L8**

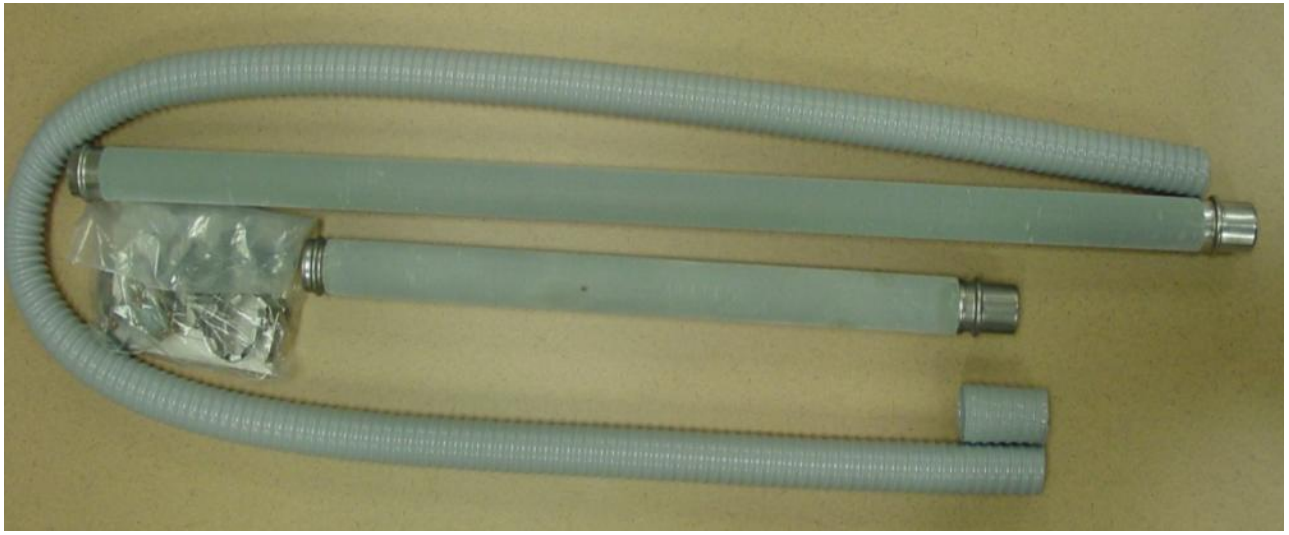
*default setting

Selecting the Correct Vent Extension Kit

EXAMPLES OF EXTENSION SETS

- The following examples are for ES11 /EX11C Models.
- Other models will vary.
- Instructions and all hardware are included.

FOT-155 EXTENSION SET: 12-20 INCHES

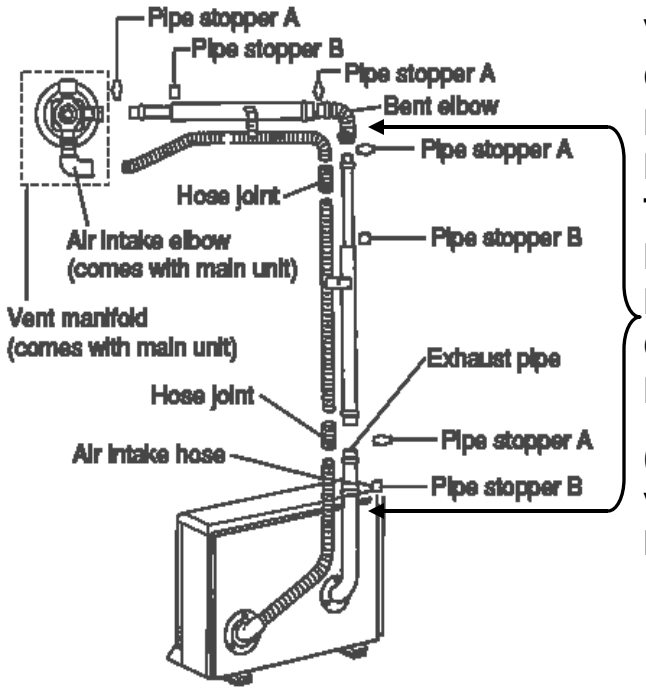


FOT-157 EXTENSION SET: 61-80 INCHES

Vent Extension Installation Guidelines

PROPER VENTING INSTALLTION GUIDELINES

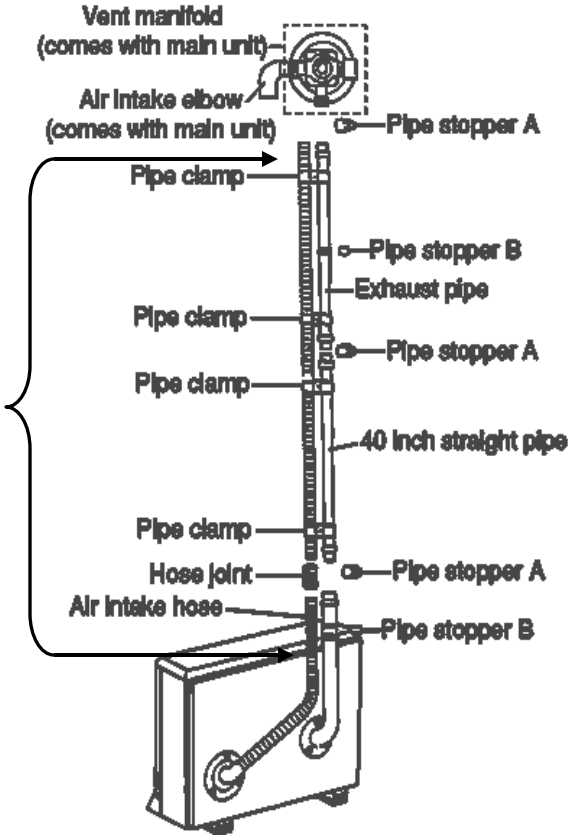
Example: Using 2 sets of extensions and 1 standard bent elbow



VERTICAL RISE OF EXTENSION FROM TOP OF THE FURNACE TO THE TERMINATION OR ELBOW CANNOT EXCEED 10 FEET ON THE 17 OR 22 MODELS!

(Other models may vary, see Owner's / Installation Manual)

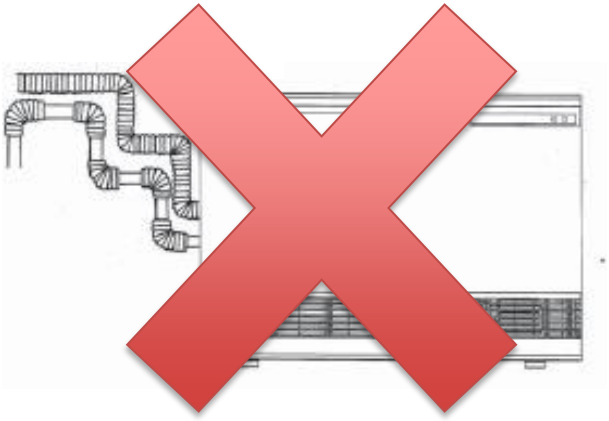
Example: Using the 80" extension set



CAUTION **Use the pipe stoppers, connectors, clamps, and screws according to each extension set and model's installation instructions to ensure no leakage of exhaust gases!**

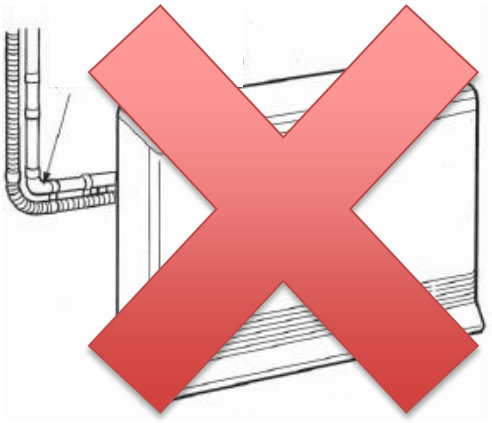
Vent Extension Installation Guidelines

PROPER VENTING INSTALLTION GUIDELINES



INCORRECT!

- **Only two elbows are allowed!**
- **Venting cannot be turned down!**



INCORRECT!

- **Never arrange elbows where condensation can collect in the venting!**

CORRECT!

- **Slope venting where condensation is allowed to drain!**

CAUTION **Use the pipe stoppers, connectors, clamps, and screws according to each extension set and model's installation instructions to ensure no leakage of exhaust gases!**

Alternate Vent Termination Options

ALTERNATIVE TERMINATION CONNECTION

Flexibility for venting terminations is engineered into every Rinnai unit. Note below where the exhaust alignment position can be changed by moving the stainless steel plug for two additional positions depending on the application. Likewise note the two positions for intake air flexibility.

1. Remove the plug from the back of the termination

2. Reposition the plug to the bottom of the termination where labeled “exhaust”

3. Extension venting or elbows can now be connected to the back of the termination

NOTE: The elbow that is integrated into the termination DOES NOT count as one of the two elbows allowable

Vent Extension Installation Guidelines

PREPARING FOR EXTENSION INSTALLATION

1. Located on the top back spacer are two sets of two punch outs (one on the left and one on the right). Remove the two that the extension will travel thru. Discard the excess sheet metal.

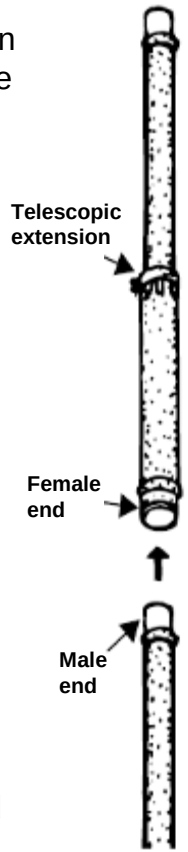
2. If the top back spacer is already secured to the furnace, temporarily remove it to allow fastening of the extension components to the furnace air intake and exhaust.

3. Measure from the end of the furnace exhaust to the point of termination or extension elbow. **NOTE: Refer to each model's manual to ensure the vertical rise limit is not surpassed!**

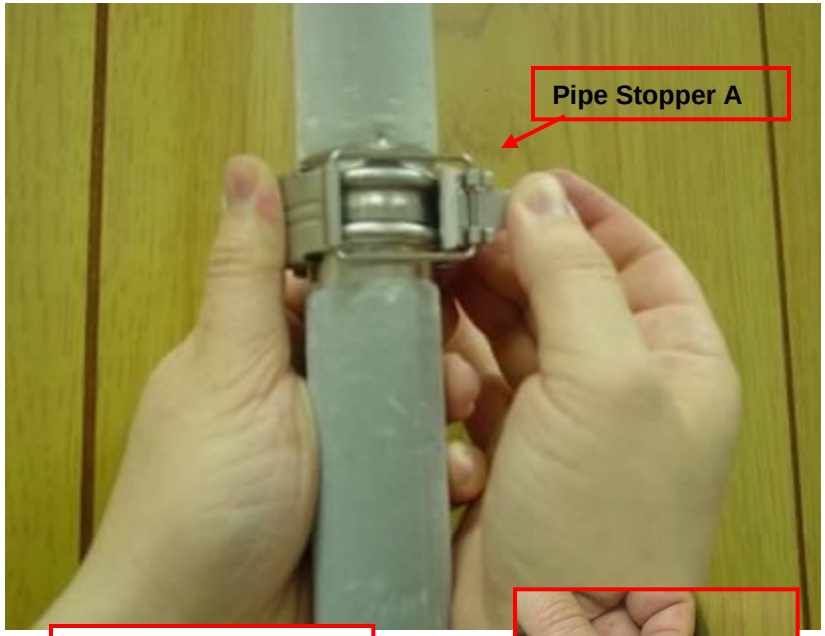
Vent Extension Installation Guidelines

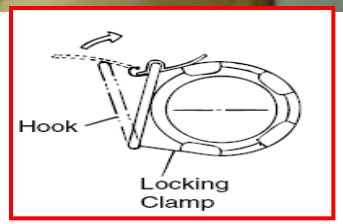
INSTALLING THE EXHAUST EXTENSION

1. The exhaust is connected between the bent pipe at the rear of the furnace and the exhaust port on the flue manifold.
2. Connect exhaust pipes with other straight pipes or bends (including the furnace exhaust) by fitting the male end into the female end.
3. If needed, extend the telescopic portion of the extension to the desired length. Do not extend beyond the red line.

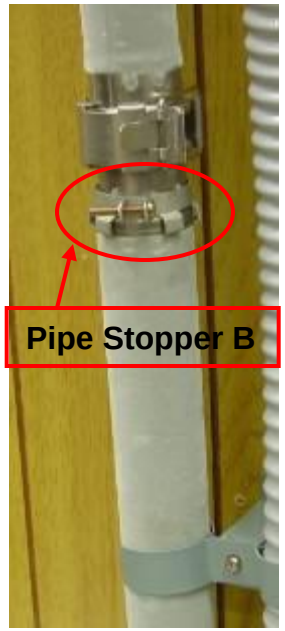


NOTE: Never cut the exhaust extension





4. Use pipe stopper A to clamp the connection of two pipes.



5. Use pipe stopper B to secure the length of the telescopic pipe.

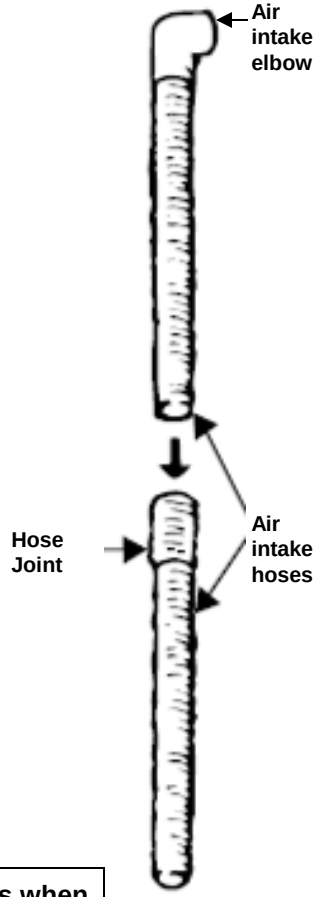
Vent Extension Installation Guidelines

CONNECTING THE AIR INTAKE EXTENSION

1. The air intake extension is connected between the air connection at the rear of the heater and the air intake port on the flue manifold.
2. Cut the air intake extension to the desired length. The lengths of the air intake hose and the exhaust pipe must be the same in order for the appliance to operate properly. Deburr all rough edges.

NOTE: Never cut the hose attached to the appliance!

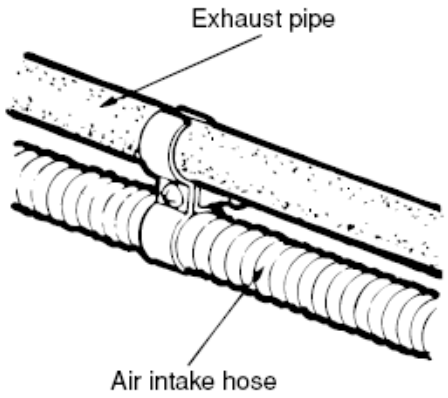
3. Remove the air intake elbow from the furnace intake hose (reverse threaded). Move this elbow to the end of the air intake extension.
4. Connect the air intake hoses by screwing (reverse thread) the hose joint half of its length into the air intake hose and the screwing another air intake hose into the hose joint.

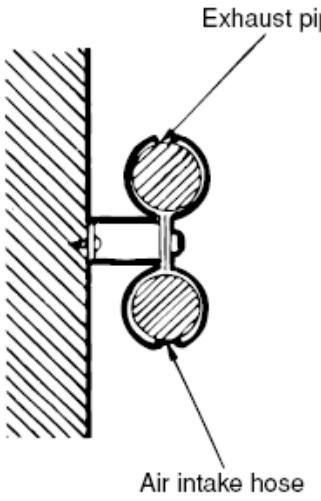


CAUTION **Practice good safety habits when using sharp tools!**

Vent Extension Installation Guidelines

MOUNTING COMPONENTS





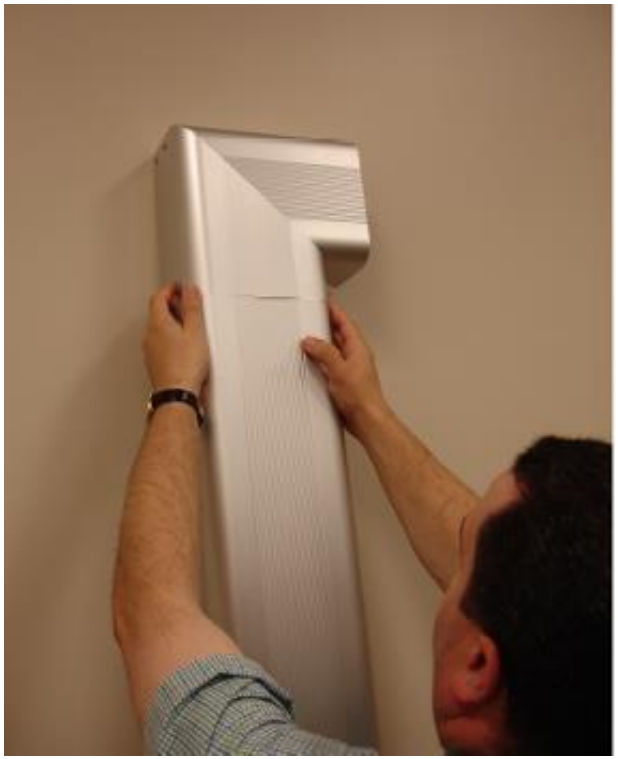
1. Both the exhaust and air intake extensions are supported by clamps which are attached to the wall. A wall fixture can be used to offset the clamp from the wall. A one inch clearance from combustibles should always be maintained from the exhaust. The clamps provided with the extension kit ensure this clearance is maintained from the wall and the air intake.
2. If extension are installed horizontally, the air intake hose should be underneath the exhaust so in the event the air intake sags, it will not contact the exhaust.

Decorative Covers For Vent Extension Kits

Vent Extension Decorative Cover

EXAMPLES OF VENT COVERS

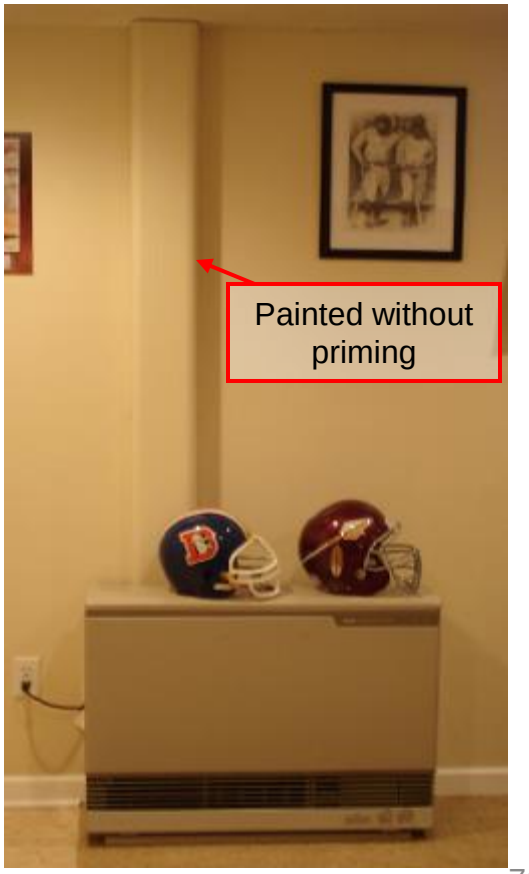
Basic Installation	Vent Cover with Elbow	Vent Cover and Termination Cover



Vent Extension Decorative Cover

EXAMPLES OF VENT COVERS

Basement Installation rough in stage	Basement Installation finishing stage	Basement Installation painted vent cover

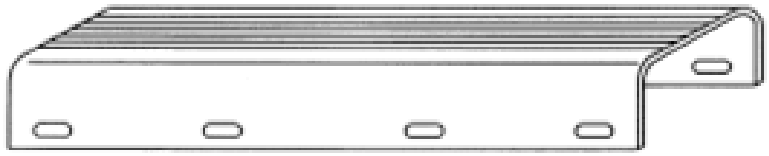


Vent Extension Decorative Cover

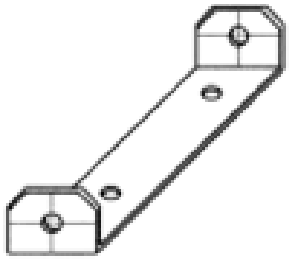
INSTALLATION OVERVIEW

- The simple design provides an easy and attractive way to cover vent extensions
- The mounting bracket is installed to the wall behind the extension venting
- The cover is mounted to the bracket from the sides
- The cover is paintable aluminum and can be custom cut.
- All covers are sold as kits.

Side View

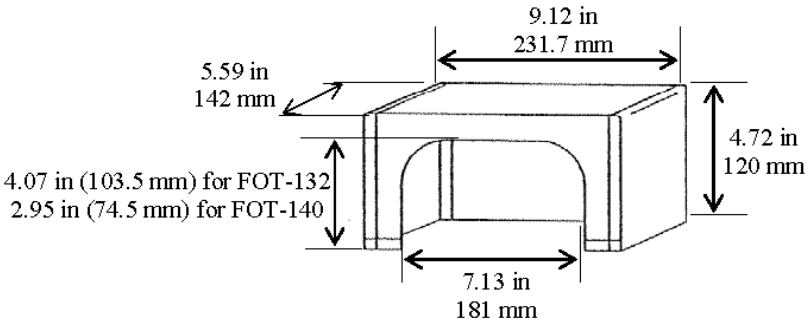
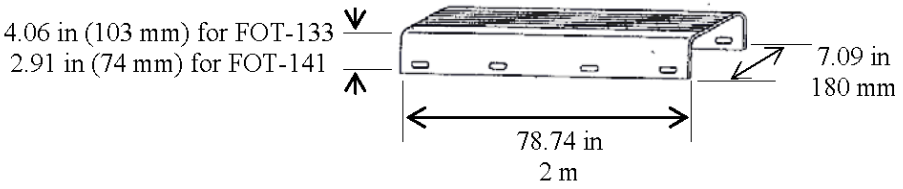
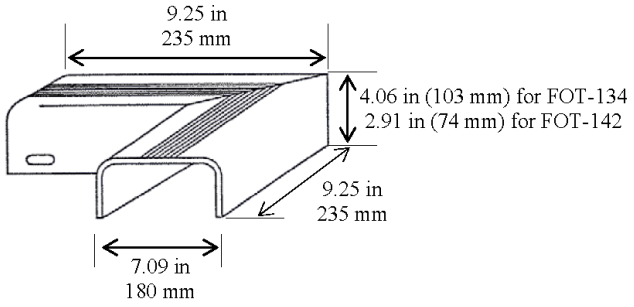


Mounting Bracket



Vent Extension Decorative Covers – New ES Series

Rinnai

MODEL *TYPE OF VENT COVER*	ES38	ES11, EX11C, ES/EX17(C), ES/EX22(C)	DIAGRAM WITH DIMENSIONS
Flue Manifold Cover	Use kit FOT-132 Manifold Kit A	Use kit FOT-140 Manifold Kit B	
Vent Cover	Use kit FOT-133 Straight Cover Kit A	Use kit FOT-141 Straight Cover Kit B	
Vent Cover Elbow	Use kit FOT-134 Elbow Cover Kit A	Use kit FOT-142 Elbow Cover Kit B	

NOTES:
- ES08/EX08 models cannot use extended venting
- Each kit comes with all required mounting hardware

This completes the direct vent installation course. Please contact technical support with any questions or issues.

1-888-746-6247